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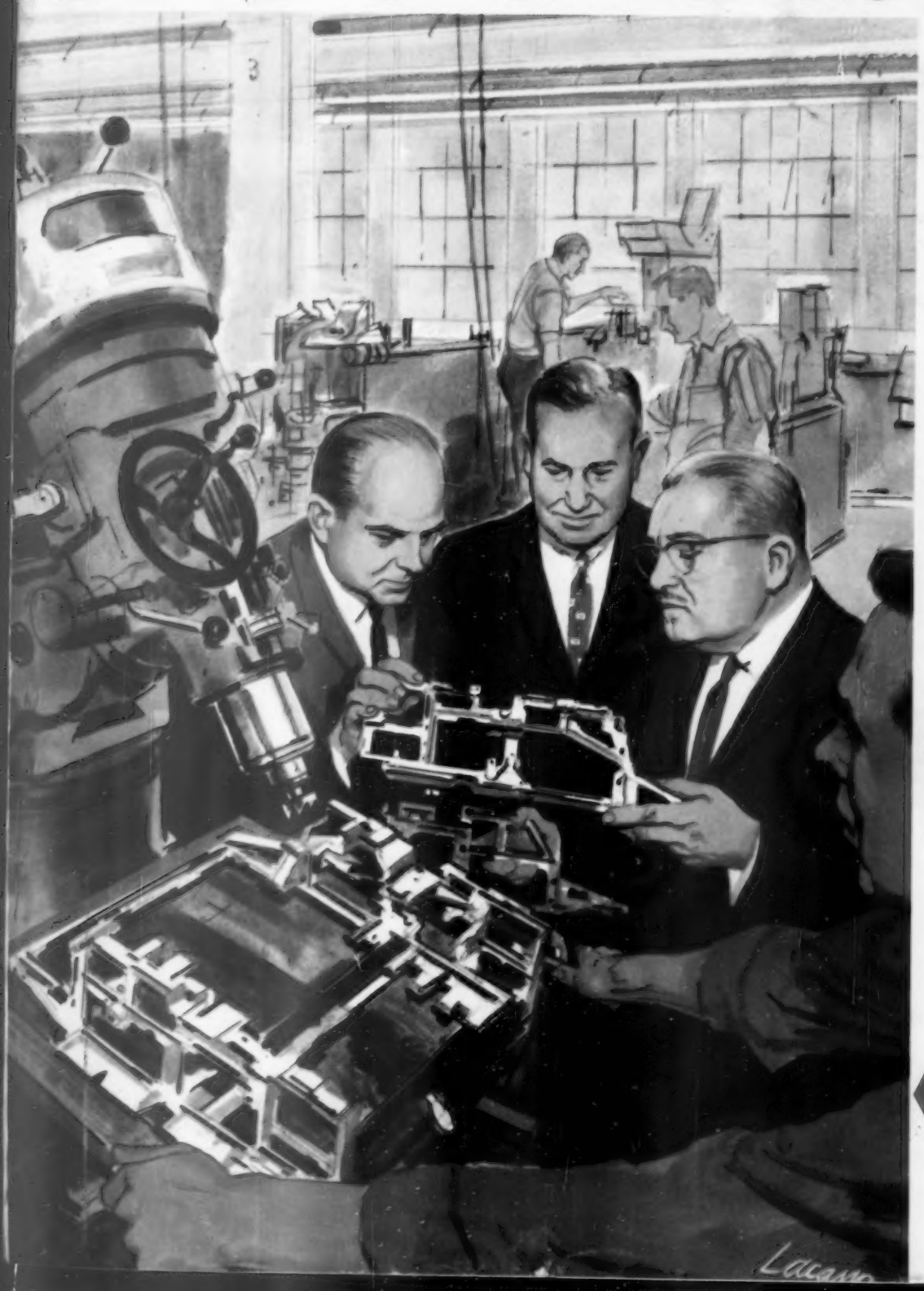
FACTORY

FOR
BETTER MANAGEMENT
OF
PLANT OPERATIONS

march 1961

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

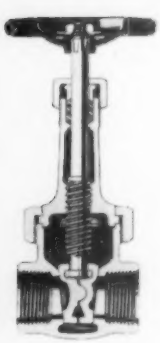


EXCLUSIVE

WHAT DO THE BIG STRIKES MEAN TO YOU?
p. 60

COVER STORY
IMPORTS CAN'T KILL THIS PLANT
p. 90

No other 125 lb. Union Bonnet Bronze Gate Valve has all these features



Union Bonnet for extra safety . . . *cylindrical* body design to distribute pressure uniformly and prevent distortion . . . *extra thickness* at points of greatest strain . . . these features *alone* provide the vital margin of superiority over other valves in its class. Together with Stemalloy Stems®, Non-Slip® Handwheels, and many other exclusive features, they actually put this outstanding new valve in a class by itself. You will *see why* when you compare it part-for-part with any other valve designed for similar service. Let your Lunkenheimer Distributor make this comparison for you, or write the Lunkenheimer Company, Cincinnati 14, Ohio.

You Can't Find the Cost of a Valve on a Price List

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THE ONE *Great* NAME IN VALVES

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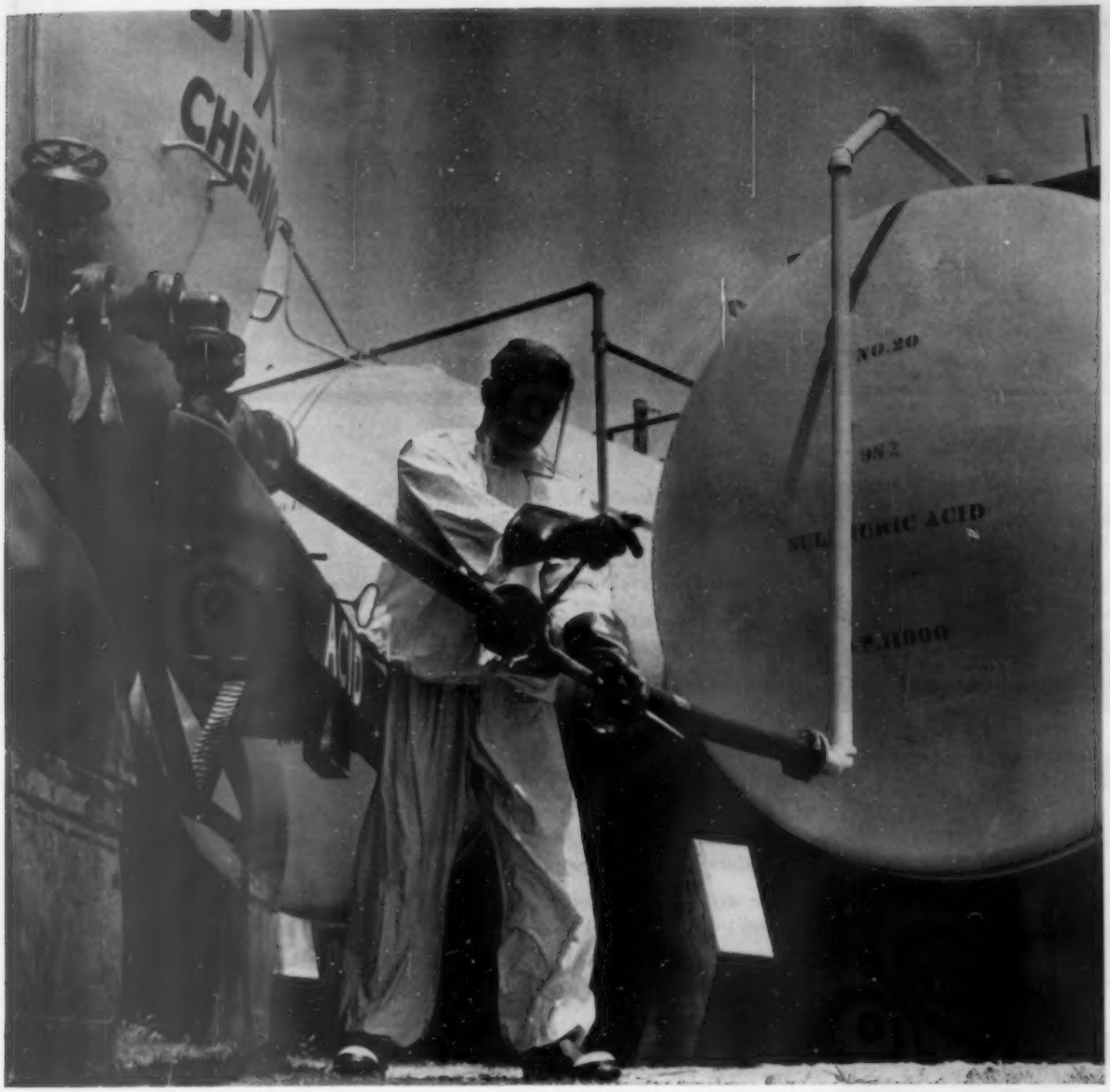
For more facts circle 382 on READER SERVICE CARD



Hoseful of hot stuff

How an improved kind of hose makes acid handling safe

IT'S only a few feet from truck to storage tank. But it used to be a most expensive short haul for cargoes of highly corrosive acid. The acid is so strong and powerful it would chew through ordinary rubber hose in no time. Metal tubing couldn't take sharp angles or stand much bending.

Then a B.F.Goodrich distributor told the company about a new hose that had been developed by B.F.Goodrich. This hose was lined with a special new rubber compound made to defy even the most corrosive acids and chemicals.

The hose above is made of this new material. It has already lasted several times as long as regular hose and the end is nowhere in sight. And there have been no costly and dangerous acid leaks. What's more, workmen claim this new hose is lighter, easier to handle because it's more flexible, faster to hook up because of special attachments at the hose ends.

Your B.F.Goodrich distributor has complete information on the new B.F.Goodrich acid hose described here. And, as a factory-trained specialist in rubber products, he can answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Dept. M-966, Akron 18, Ohio.*

B.F.Goodrich

ACID HOSE

FOR BETTER
• PLANT MAINTENANCE & ENGINEERING
• PRODUCTION
• PLANT MANAGEMENT

MARCH 1961

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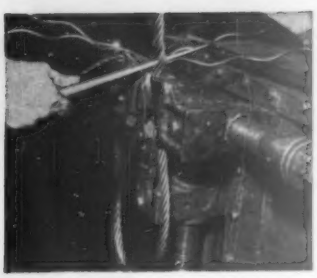

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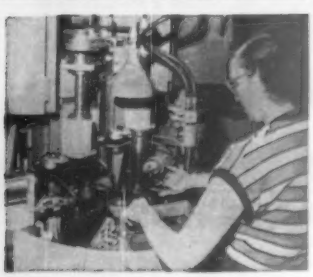

Five-in-one drilling machine is one reason for the slash in direct labor costs at Bell & Howell (page 162) . . . **Cloak-and-dagger activity** is guarded against at Ford (page 164) . . . **Pipes almost clean themselves** at Carnation plant (page 166) . . . **Hanging out crying towel** during off-work hours is one way this personnel office keeps workers happy (page 170) . . . **Room within a room** catches all the noise at Allis Chalmers (page 172).

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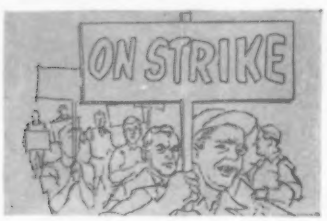

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COMING

In April read and see how an up-and-at-'em organization did something about the hidden waste in portable air tools. To find out how it could get a full dollar's output from a full dollar's investment, Rotor Tool made a careful study and came up with some amazing conclusions. In May look for our special editorial effort—presentation of the winners of FACTORY's 27th annual competition for the Top Ten plants.

COVER

Examining typewriter frame at Royal McBee's completely renovated Hartford (Conn.) plant are (left to right) Managers F. F. Behm and A. S. Cook, and Chief Industrial Engineer E. Goslee.

Painting by Frank Lacano

70TH YEAR OF PUBLICATION
MARCH 1961 Vol. 119 No. 3
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New slanted "full-vision" cowl that makes load pick-up unusually fast and easy, is an outstanding feature of Towmotor Stream-Liner Series fork lift trucks (above). Load capacities, 3000 to 5000 lbs. Diagram below shows how operator is able to see within 12" of the heel of forks.

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—in more plants, in more ways, with more money-making features. On the move, handling more materials, gaining lost storage, speeding distribution. On the move, raising productivity, lowering costs, increasing profits. Get going with Towmotor fork lift trucks and carriers—made only by TOWMOTOR CORPORATION, CLEVELAND 12, OHIO.

TOWMOTOR
THE ONE-MAN-GANG®

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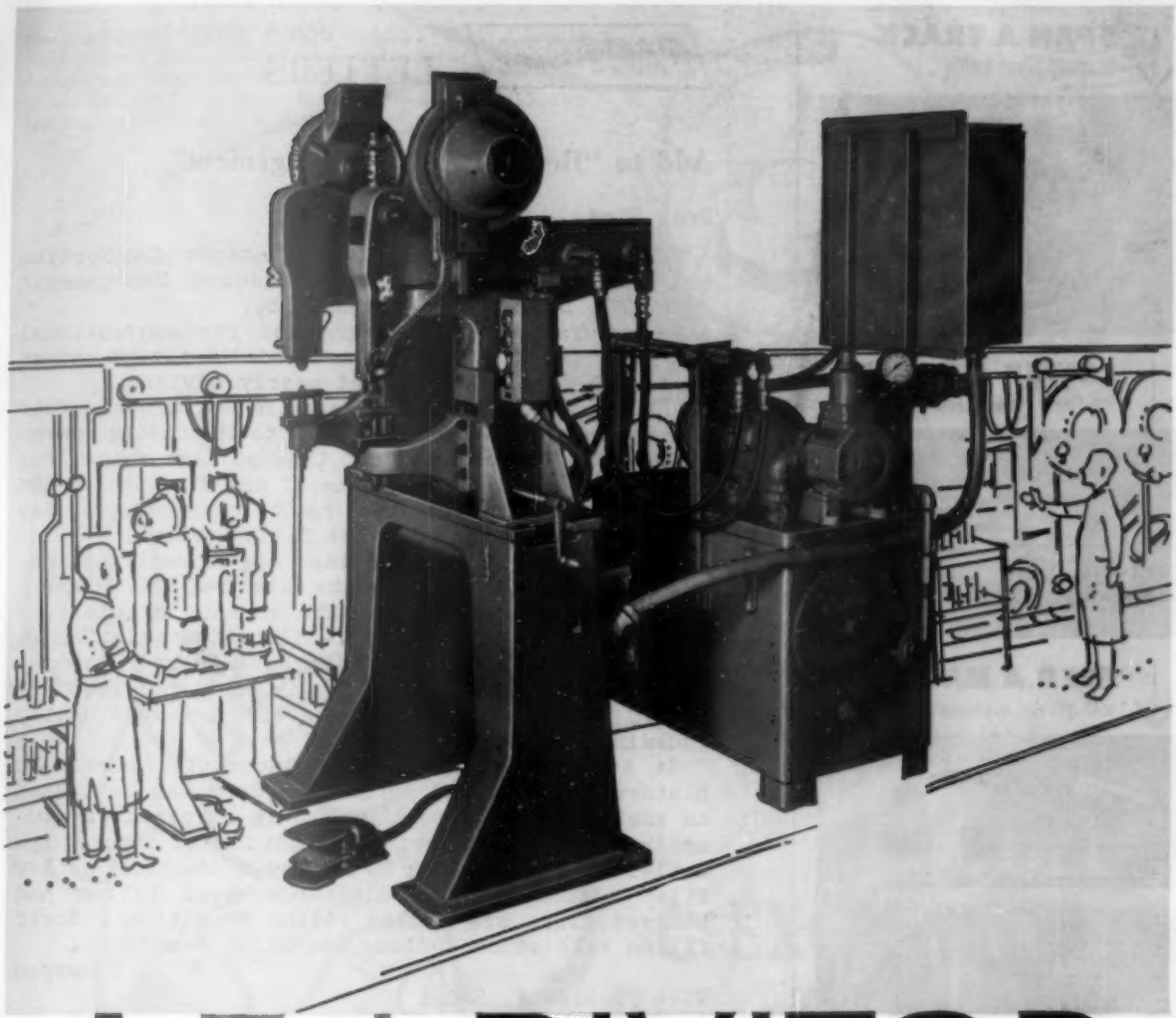

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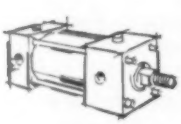
on your production line means higher production rate . . . lower unit cost!

T-J Rivitors and Clinchors are designed, engineered and manufactured to conform and operate efficiently on today's high-speed production lines. For whatever your product . . . if it demands a fastening assembly procedure . . . a T-J riveting or clinching machine adds to its high quality standards by their ability in providing long, rugged service-free life.

Many standard designs to choose from . . . or a T-J can be custom designed for your exact requirements. Write Tomkins-Johnson, 2425 W. Michigan Ave., Jackson, Mich., today. Ask for Rivitor and Clinchor Bulletin No. 646 or Clinchor Bulletin No. 555.

RIVITORS

CLINCHORS



CYLINDERS

CUTTING TOOLS

T-J TOMKINS-JOHNSON
JACKSON, MICHIGAN

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SPAN A TRACK
to speed plant traffic

LOWER A TRUCK
for faster loading and unloading

FEED A MACHINE
with greater economy and efficiency

LEVELATOR LIFTS
handle heavy loads at lower cost

Operating on economical oil-hydraulic power, Rotary Levelator Lifts can be used wherever heavy objects must be raised or lowered. Standard models with 6,000 and 12,000-lb. capacities are designed for a wide variety of uses and are stocked for immediate delivery. Special Levelator Lifts in any capacity to several hundred thousand pounds can be engineered to your requirements. Simplicity of design and operating mechanism makes installation easy and practically eliminates any maintenance expense.

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FACTORY LETTERS

Add to "Better Records Management"

Dear Sir:

We read with interest and some amazement the section on open-shelf filing in "Better Records Management" (FACTORY, December 1960, page 93).

We manufacture filing supplies for conventional and shelf systems. We have no special interest except to see that business is not poorly advised.

The generalizations contained here (on open-shelf filing) can cause serious damage to the filing operations of readers who accept them at face value. For example, there is no evidence of any kind that a 50% reduction in reference time can be realized over any reasonably organized cabinet filing system.

It is true that space savings can be realized frequently, but usually not to the extent of 70%. It makes no sense to save space at the expense of clerical payroll. Every active shelf-filing installation we have studied produced no time savings and, in many instances, required increases in personnel requirements. Also, bulkier filing devices and more costly indexing devices raise costs.

It is correct, too, that blueprints, personnel history folders, and purchase orders can be housed on shelving—provided they are in a relatively inactive stage and filed in straight number order. High activity (anything over 2% per day of the total active file) alphabetic and digit-numerical filing and subject files are random filing operations. Shelf filing will cause serious operation handicaps.

W. I. Thompson
Vice President, Sales
Oxford Filing Supply Co., Inc., Garden City, N. Y.

Compliments from an experience-wise reader

Dear Sir:

"Your Part in Unemployment" (September 1960 FACTORY, page 98) was excellent. It's very much in line with the way we view the problem here at General Electric. In fact, if you're familiar with the offer we made in our recent union contract negotiations, you probably remember our proposal for retraining and reassigning. This was directed toward the social problem created when management takes steps to improve the effectiveness of its business.

Unfortunately, the largest union we deal with, the IUE, turned down the proposal for reasons unknown. We believe this was a serious mistake on their part since this program was a real attempt to face up to the employment security problem which plagues all major industries. Your article certainly supports our contention.

F. H. MacIntosh
Public and Employee Relations Dept.
General Electric Co., Schenectady, N. Y.

Turn the page

The nearsighted MISTER MAGOO says . . . "1956? A banner year! Princess Grace was married—unfortunately I couldn't attend—and General Electric invented the Power Groove Lamp. Happy birthday, Power Groo—Bowser! drop that salami! You've taken enough bites out of it already!"

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G-EXCLUSIVE! Power Groove® cuts your initial costs as much as 40¢ a sq. ft.

General Electric Power Groove Lamps start saving you money the day you specify them.

By any standard of comparison, they give you more light—with fewer lamps—than any other fluorescent type or brand. If you're building or remodeling, Power Groove Lamps *can save you up to 40¢ per square foot of lighted floor area* right off the bat.

Just the beginning. With fewer lamps, fixtures and ballasts overhead, your maintenance men spend less time on ladders.

Your employees' increased efficiency helps pay for Power Groove Lamps. If every reject makes you wince, consider how improved lighting—at no extra cost—might spruce up your operation. Perhaps you can remove the individual lamps that light only machines or tables.

General Electric's 5-year-old secret is in the grooves. They bend a 9-ft. arc stream through an 8-ft. tube and swing it closer to the light-producing phosphor coating. No other fluorescent lamp compares with the Power Groove. Call your General Electric Lamp distributor when *you* need lamps. General Electric Co., Large Lamp Dept. C-14, Nela Park, Cleveland 12, O.

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One Clerk...10,000 Items
Her Speed?...

10 postings per minute!

***VISI*record's split-second record location makes it the world's fastest record-keeping system. The speed and convenience of *VISI*record means savings up and down the line — less manpower needed, less space required, less operator fatigue, greater accuracy.**

***VISI*record speed in machine posted or automated systems actually kills idle machine time. And, *VISI*record works equally well in accounts receivable, purchase order follow-up, maintenance control and any of a hundred other applications in large or small organizations, where records must be kept and used quickly and accurately.**

Your *VISI*record man will be happy to show you how you can apply speed to your record-keeping the *VISI*record way. Meanwhile, write for case histories and other data.

See VISIrecord at the Business Equipment Exposition— New York Coliseum, April 17-21. Write us for tickets!

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375 PARK AVENUE, NEW YORK 22, N. Y.

VISIrecord

Systems Specialists in Principal Cities

For more facts Circle 389 on Reader Service Card

Begins on page 6

Whodunit solved

Dear Sir:

You omitted important names in "Tank Recalibration," an item that appears on page 132 of FACTORY's January 1961 issue.

The method described is used by Shell Oil Co. Also, the equipment used in the process includes Rockwell-Rotocycle meters and Rockwell-Nordstrom valves. Both these products are made by Rockwell Manufacturing Co., Pittsburgh.

Richard D. Wathen
Burson-Marsteller
Associates, Inc.
New York, N. Y.

► **We apologize to our readers, as well as to Mr. Wathen, for these omissions. Someone on the staff made a miscue with a miscut.—ED.**

Cost of maintenance

Dear Sir:

This is in reply to your letter of Dec. 22 concerning the differences in maintenance and repair expenditures tabulated in our supplementary costs survey and similar data published in FACTORY (February 1959, page 72).

We have reviewed the matter and have not yet fully completed our study. It appears clear, however, that the major reason for differences is the fact that our figures are the result of reports from manufacturing establishments. The reports to the Securities and Exchange Commission are on a company basis and they often include non-manufacturing activities and administrative offices which are excluded from our tabulations of maintenance and repair expenditures.

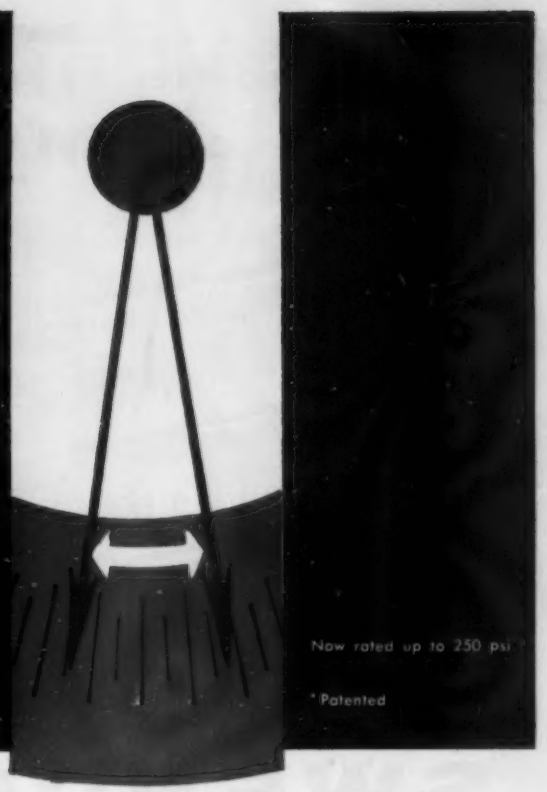
There are three industrial areas in which your figures are greatly in excess of

NEW

MULTI-ZONE

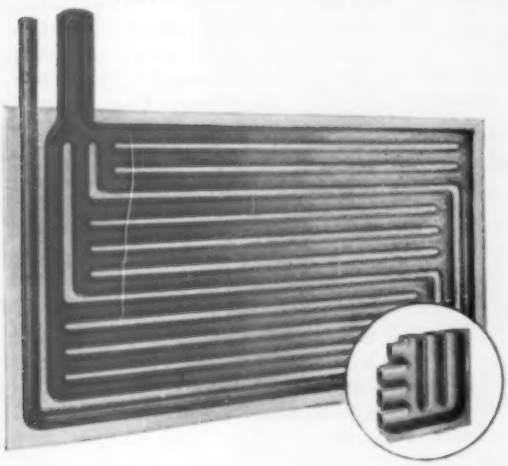
PLATECOIL®

FASTER START-UP, CONSTANT TEMPERATURES



The new MULTI-ZONE design cuts "downtime" and compensates for intermittent overload in a wide range of tank and process heating applications. Multiple headers and multiple condensate returns provide for FREE-FLO action — with practically instantaneous distribution of steam to all levels of the plate. Condensate "trapping" is held to a minimum. This gives the new MULTI-ZONE PLATECOIL a reserve capacity to deliver under overload conditions during "start-up." It also produces extremely fast recovery of tank temperature with minimum variation.

IN ALL KINDS OF TANK AND PROCESS HEATING



Operating Pressures up to 250 psi — DURAWELD bonding of the plates and mill-controlled TRANSTEEL in standard units have boosted PLATECOIL pressure containment rating up to 250 psi. This makes the time-proven advantages of PLATECOIL applicable to many types of heating where 250 lb. steam is required. Destruction tests have demonstrated a safety factor of 5 to 1.

Low Installation and Maintenance Costs. — PLATECOIL costs are low compared to the cost of engineering, fabricating, installing and maintaining pipe coils. Lightweight, compact PLATECOIL simplify installation. Greater heat transfer per sq. ft. of surface permits smaller units which save valuable tank space. Streamlined surfaces cut cleaning costs. Integral, factory fabricated construction eliminates threaded joints (in the solution) to corrode or leak. All stainless steel and alloy PLATECOIL units affected by cold working are annealed and pickled after fabrication to return the metal to its original condition and thus eliminate the probability of corrosion due to internal stresses and carbide precipitation.

Write for NEW PLATECOIL Bulletin P60 for more data.

Tranter Manufacturing, Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

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Manual Impact Wrenches

NOW AVAILABLE IN NEW ½" & ⅝" UTILITY SIZES

Small in size, the all new ½" and ⅝" SWENCH manual impact wrenches are big in power when it comes to loosening tough, small sized "frozen" nuts and bolts.

Like the heavy duty SWENCH wrenches for industrial use, the new ½" and ⅝" sizes apply a tremendous wallop of torsional impact in automotive, light industrial, commercial, and utility use.

Now a completely portable SWENCH can be taken to any job — big or small — for high speed, safe and easy removal of "frozen" nuts and bolts that previously had to be burned off or drilled out. SWENCH wrenches are economical too — they cost far less than other types of impact wrenches and save valuable man hours.

In addition to the new ½" and ⅝" sizes, SWENCH wrenches are available with ¾", 1", 1¼" and 1½" drives. Call your local industrial distributor today for a demonstration or write to:

Don't wrench it - SWENCH IT!

CURTISS WRIGHT
MARQUETTE DIVISION
1145 Galewood Drive, Cleveland 10, Ohio

AD NO 32-4

Begins on page 6

ours: Motor Vehicles (SIC Code No. 371), Petroleum Refining (291), and Blast Furnaces and Steel Works (331). These are all industrial areas where leading companies have large non-manufacturing activities and have rather substantial foreign activities which might be included in a consolidated profit and loss statement. In the Census survey only maintenance and repair expenditures at manufacturing establishments in the specified industries are included in the total.

Our research shows a substantial error in our figures for Motor Vehicles (371), which will be corrected in a revised publication to be issued shortly. But the corrections still leave our figures for the SIC 37 group considerably smaller than the $1.6 billion in your report.

In summary, our research—which included comparison of the data reported to us and the company figures on maintenance and repair as shown in "Moody's Industries for 1957"—indicates that the main cause for differences is the company definition used in your tabulation and the establishment definition used in our estimates.

Robert W. Burgess
Director,
Bureau of the Census
U. S. Department of Commerce
Washington 25, D. C.

► **This letter was received after press time for FACTORY's February 1961 editorial commentary, "The High Cost of Maintenance," in which these dif-**

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY, 330 West 42nd St., New York 36.

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Circle 392 on Reader Service Card for items on next page

EVEN FULL STRENGTH HYDROCHLORIC ACID CANNOT TOUCH THIS HAND...

...PROTECTED WITH "KERODEX"®

"KERODEX" PROTECTS AGAINST...
(partial list)

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- ACIDS
- AMMONIA
- ANILINE DYES
- BATTERY ACIDS
- CAUSTIC SODA
- CEMENT (Wet or Dry Powder)
- DETERGENTS
- DYES (aqueous)
- EPOXY RESINS
- FORMALDEHYDE
- HYDROCHLORIC ACID
- PAINTS (water base)
- PLATING SOLUTIONS
- RUST PREVENTATIVES
- SALTS
- SILICATES
- SOLDERING FLUXES, FUMES, PASTE
- STEEL PICKLING
- SULFURIC ACID
- UREA–FORMALDEHYDE GLUES

"KERODEX" #51

- ACETONE
- ALKALIS
- BENZOLS
- CARBON TETRACHLORIDE
- CELLULOSE SOLVENTS
- CUTTING OILS (lubricants)
- EMERY DUSTS
- ETHYL ACETATE
- FIBER GLASS
- GREASES
- GRIME
- LACQUERS
- LEAD DUST and FUMES
- PAINTS (oil)
- PAINT REMOVERS (solvent)
- PLASTICIZERS
- RUBBER SOLUTIONS
- TAR
- THINNERS

This dramatic photo shows only one of the many protective uses of "KERODEX" #71. Both types of "KERODEX" have wide application in industry.

IN-PLANT TESTING OFFER AVAILABLE. "KERODEX" Protective Barrier Cream is used in laboratories and factories of America's largest manufacturers . . . to speed hazardous processes, cut down wash-up time, save expensive soaps, cleaners and solvents. Available as "KERODEX" #71 for wet work, "KERODEX" #51 for dry work. To prove the worth of "KERODEX" in your plant, order this test offer.

ONE DOZEN 1/4 LB. TUBES OF #71 OR #51 FOR ONLY $10.80
FREE INFORMATION IS AVAILABLE TO YOU–WRITE FOR IT

WRITE DEPT. F-3

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6107

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TOLEDO ELECTRONIC TRUCK SCALE

with **PRINTWEIGH® "400"**

"speeds up weighing, provides accurate printed weights"
says William J. Torpey, General Manager

"Truck weights up to 50 tons are instantly transmitted *electronically* from the full-length 60′ scale platform to the weighing head located in the pier office. There, the weight records are automatically printed in triplicate on certified weight tickets. Our Toledo Printweigh "400" eliminates human error, speeds weighing and assures more accuracy than ever before on any scale, to trucker and customer alike."

TOLEDO's complete truck scale line gives you a full choice of capacities and platform sizes in mechanical or electronic type scales. Printweigh recording on forms, tickets or strips may be at the scale or a remote location. Many more advanced TOLEDO features are offered to speed weighing, eliminate human error. For full details, write for Bulletin 2417, TOLEDO SCALE, Division of Toledo Scale Corporation, Toledo 12, Ohio. (Toledo Scale Co. of Canada Ltd., Windsor, Ontario)

SERVICE Factory-Trained 240 Cities

TOLEDO®

Greatest name in weighing

For more facts Circle 393 on Reader Service Card

ferences were analyzed. There are some points of similarity and agreement in this letter and FACTORY's analysis. But Mr. Burgess' letter helps to probe further this perplexing question.—ED.

Results are reassuring

Dear Sir:

I have just proposed a new work-order system for maintenance and I am pleased to note it is quite similar to the Besly-Welles system (FACTORY, December 1960, page 176).

It is reassuring to know that such a system has been giving satisfactory results for six years. B-W's experience will certainly carry considerable weight in our decision on the adoption of a new system.

David M. Elovitz
Plant Engineer
High Temperature
Materials Inc.
Boston

FACTORY

March 1961 Vol. 119, No. 3

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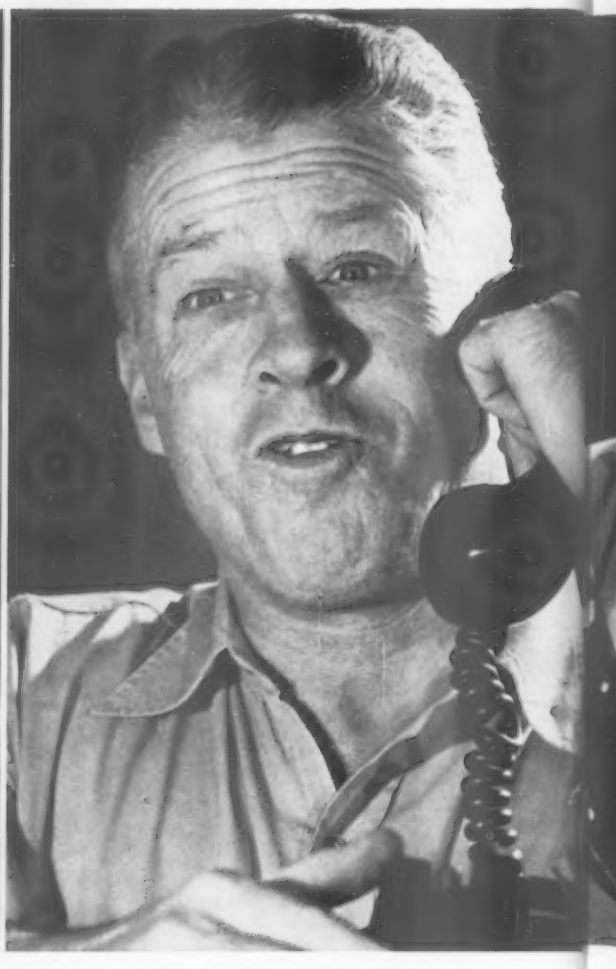

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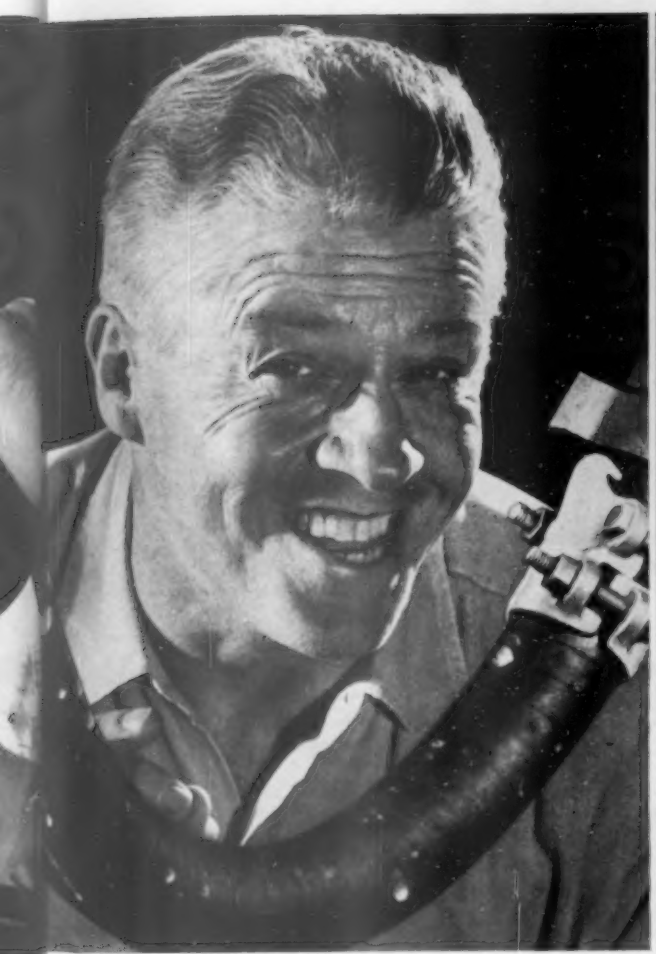

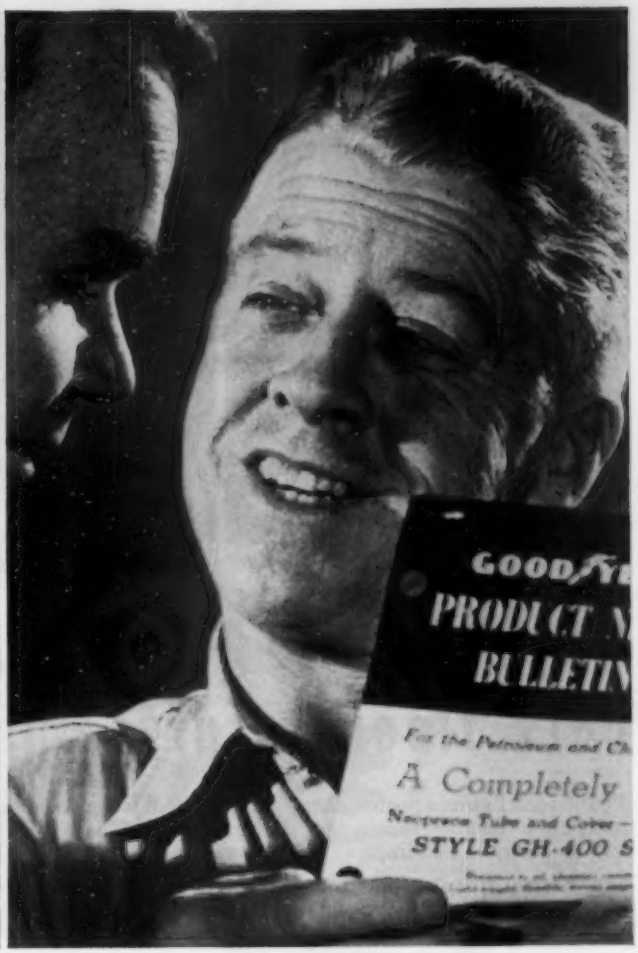

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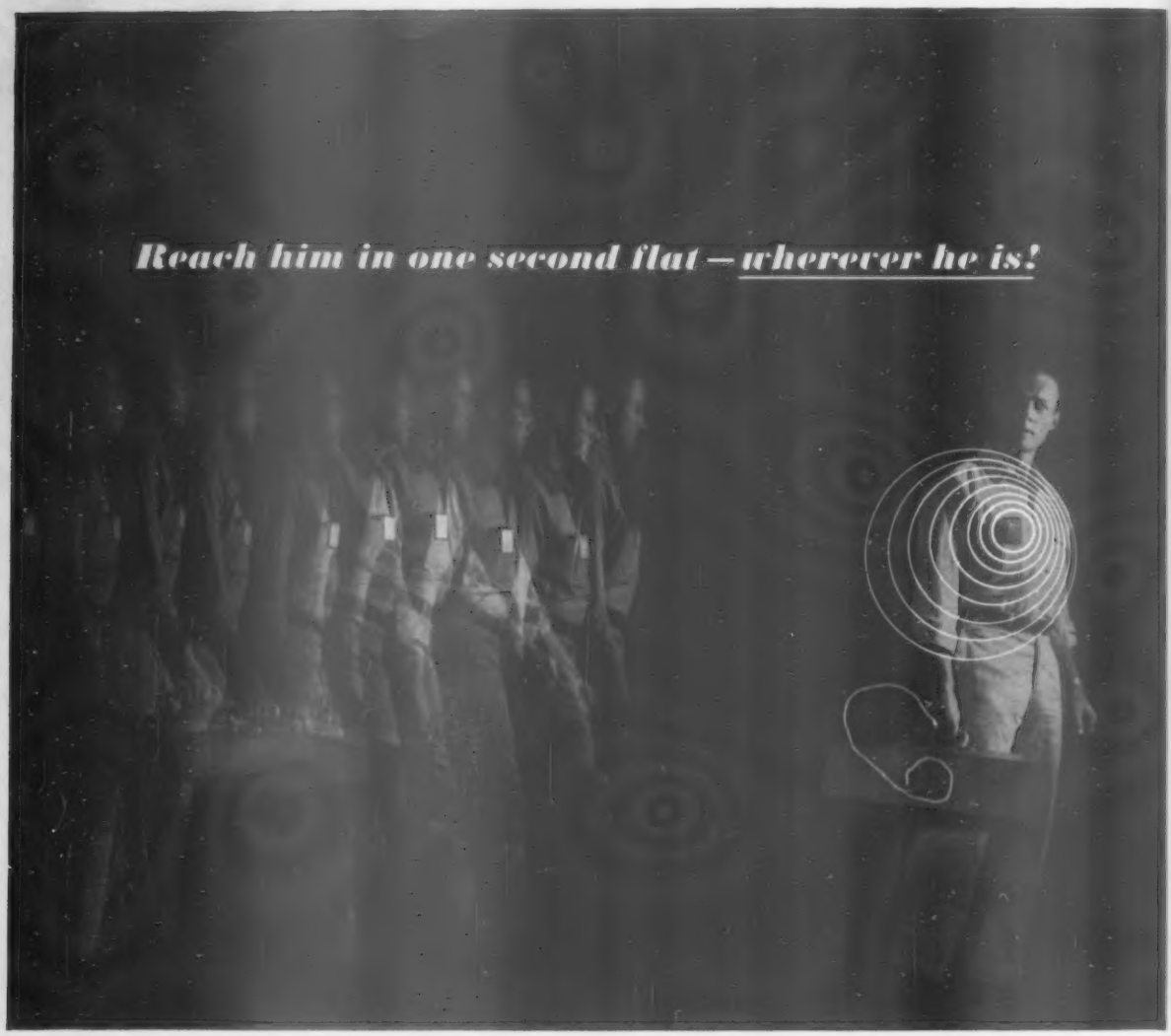

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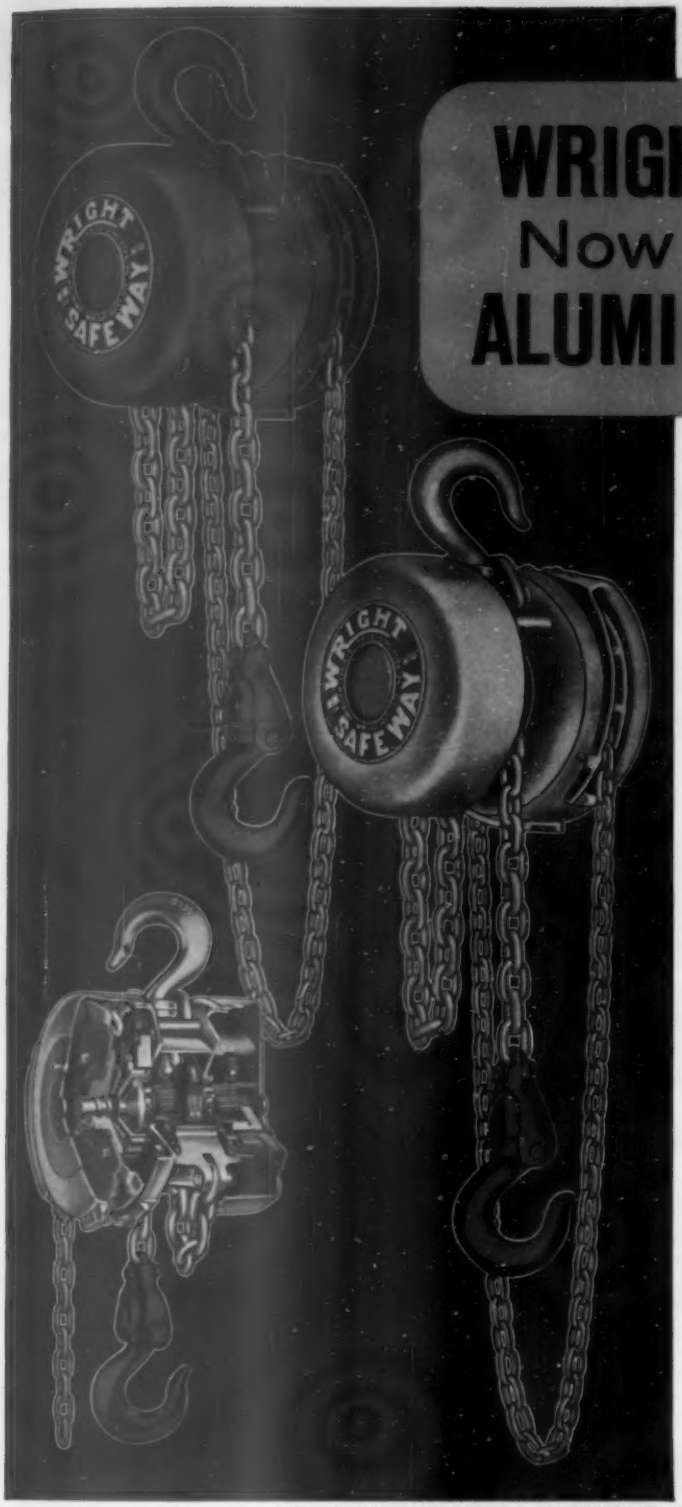

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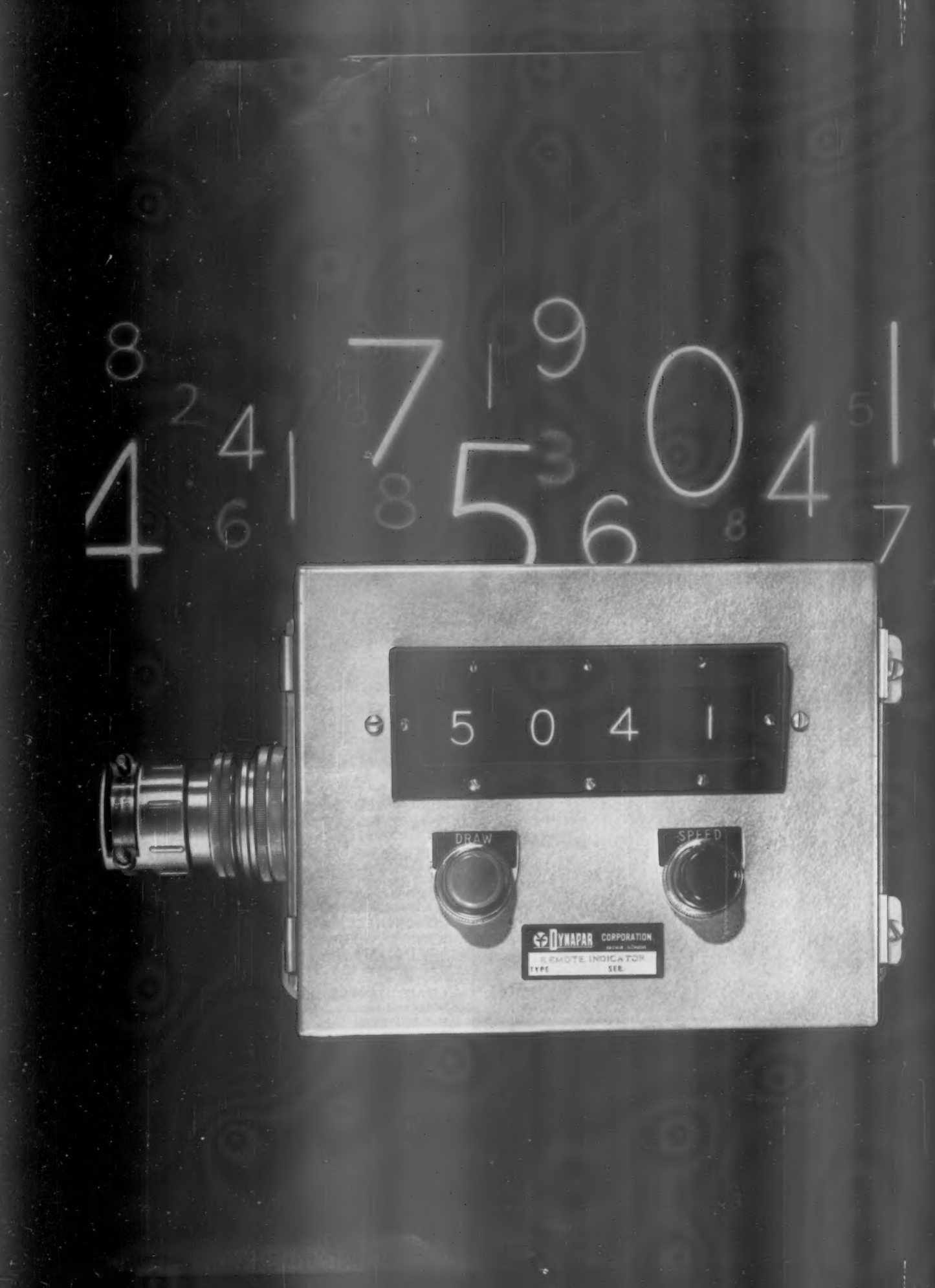
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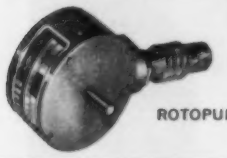

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Diamonds remove bumps from concrete runways and highways

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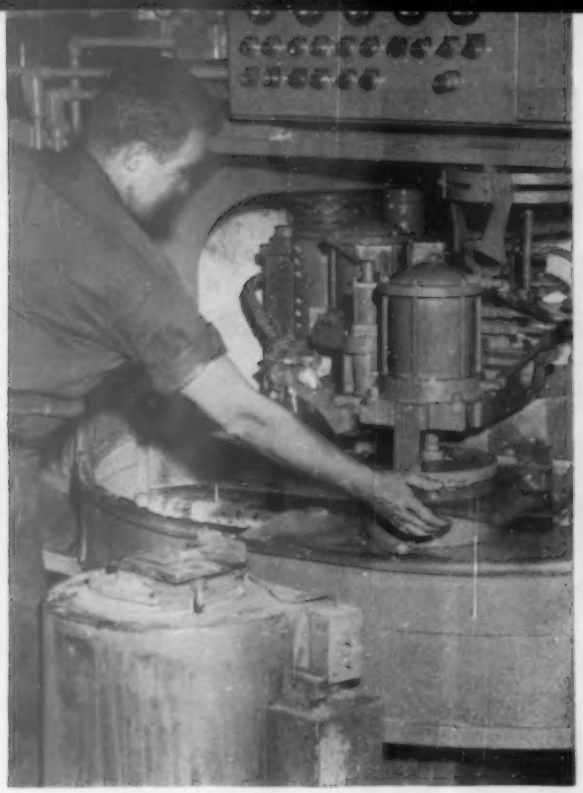

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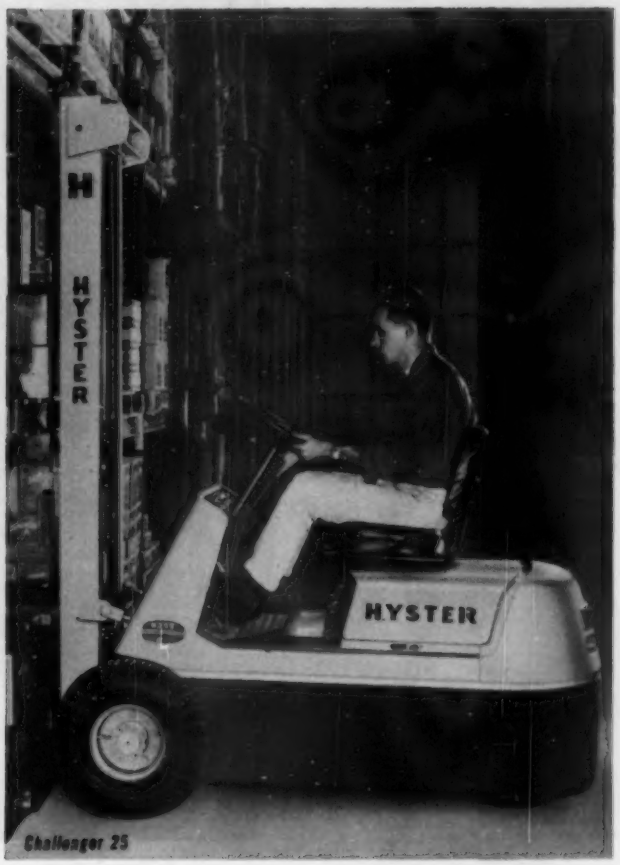

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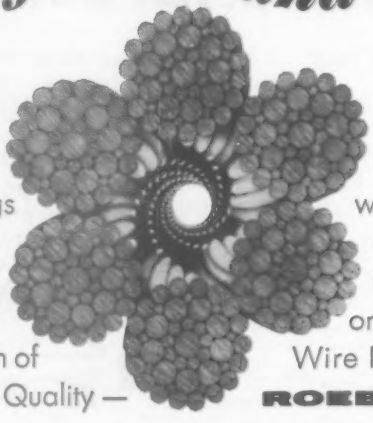
You get a lot of work out of it

quality inside and outside



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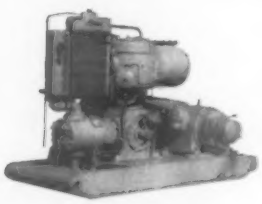

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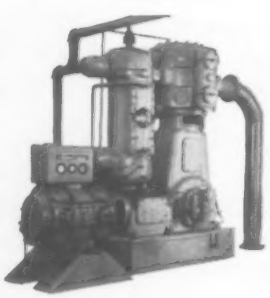


AR Heavy-Duty Compressors

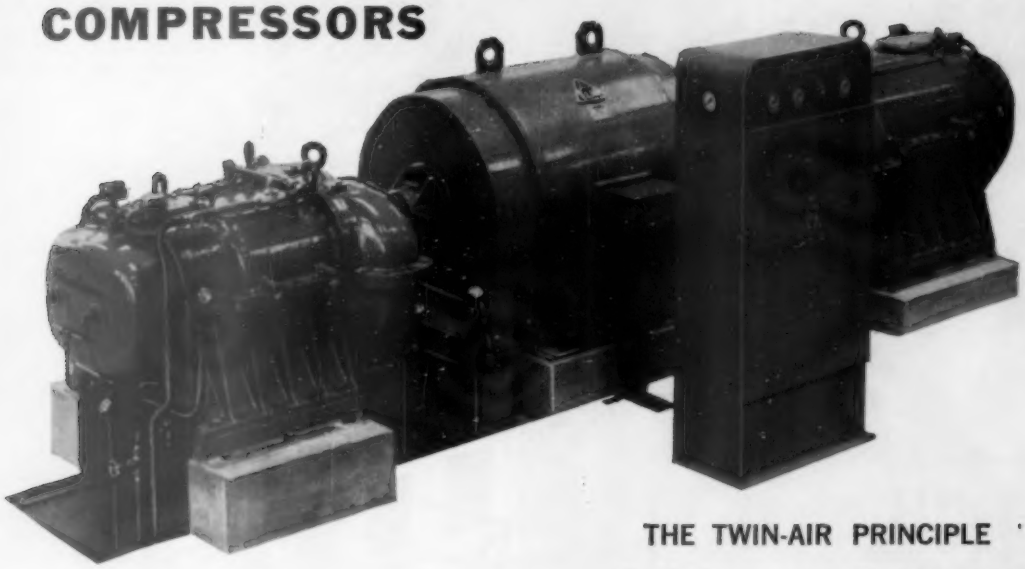
More air per horsepower than any comparable compressor! For continuous, full-load operation. "L" angle, 2-stage, double acting. Water cooled. Standard models provide 382 to 3210 cfm free-air delivery at 100 psi; only 76-590 hp required! (Can be supplied for other working pressures on request.)

Atlas Copco Atlas Copco

FACTORY

REVOLUTIONARY!

TWIN-AIR COMPRESSORS



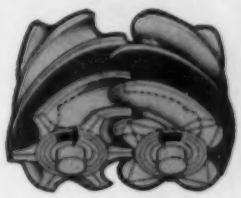
A basic departure in compressor design, employing precision-mounted helical rotors, with small clearances maintained by timing gears, thus eliminating friction (and the necessity for oil) in the compression chamber. "Twin-Air" Compressors offer surge-free delivery from 6,000 to 19,400 cfm at working pressures up to 115 psi. And, you get completely oil-free delivery of air or gas, since no lubrication is required!

OPERATION: Air Intake: Air is drawn through the inlet into the space between lobes and housing. **Compression:** Motor revolves, sealing inlet and beginning compression of the enclosed air. Rotary motion continues, producing smooth compression, until each groove in turn reaches outlet port. **Air Outlet:** Pulsation-free compressed air is forced smoothly out of compressor and outlet is set again for the next cycle.

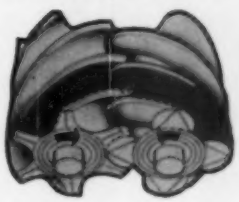
THE TWIN-AIR PRINCIPLE

1. air in

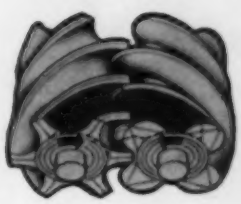
2. compression



3. compression



4. air out



Atlas Copco

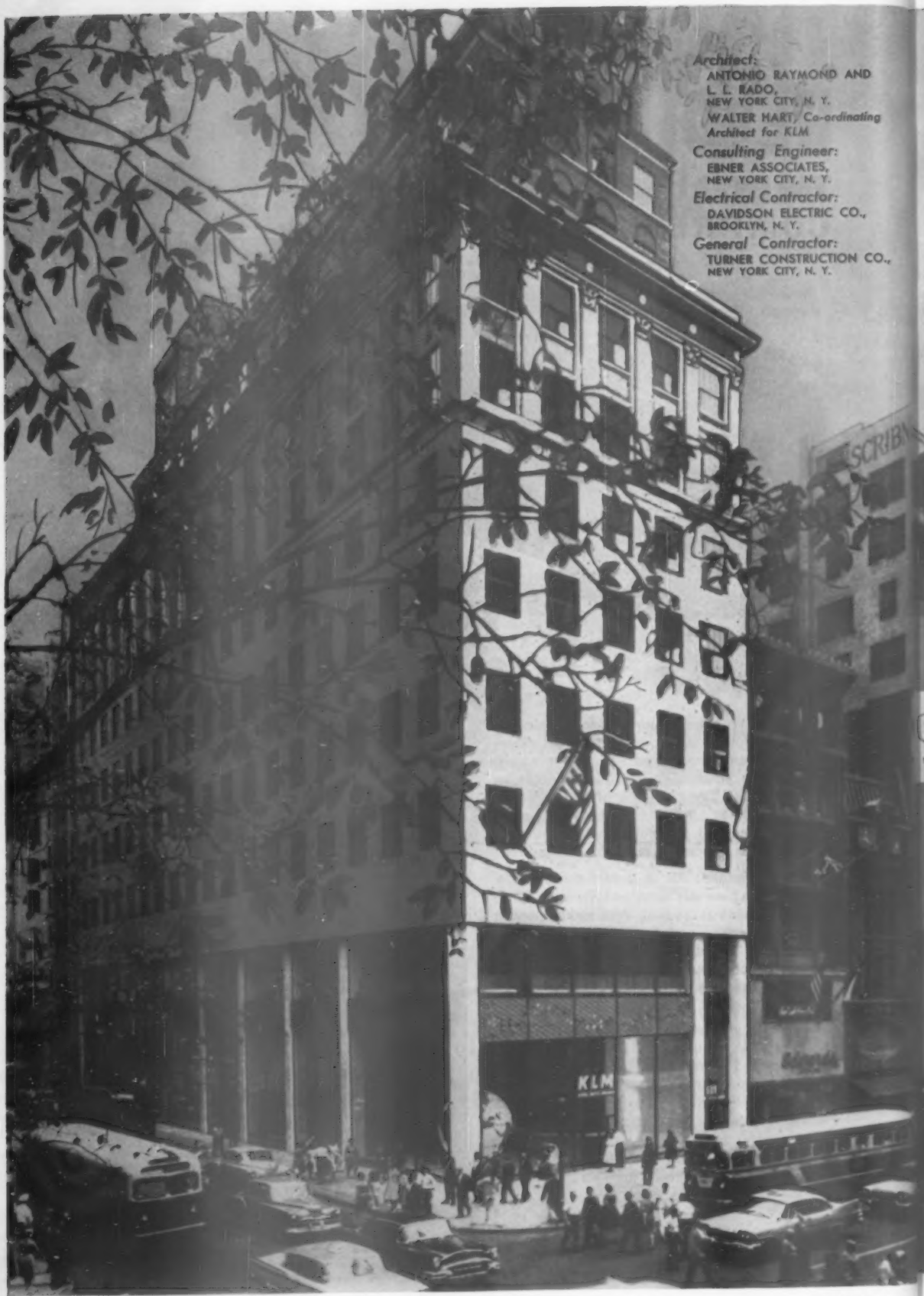
545 Fifth Avenue, New York 17, N.Y.

610 Industrial Avenue
Paramus, New Jersey
COlfax 1-6800

930 Brittan Avenue
San Carlos, California
LYtell 1-0375

Atlas Copco **Atlas Copco** **Atlas Copco**

For more facts Circle 405 on Reader Service Card



Architect:
ANTONIO RAYMOND AND L. L. RADO,
NEW YORK CITY, N. Y.
WALTER HART, *Co-ordinating Architect for KLM*

Consulting Engineer:
EBNER ASSOCIATES,
NEW YORK CITY, N. Y.

Electrical Contractor:
DAVIDSON ELECTRIC CO.,
BROOKLYN, N. Y.

General Contractor:
TURNER CONSTRUCTION CO.,
NEW YORK CITY, N. Y.

Electrical Protection *is MODERNIZED* with BUSS fuses in the KLM Royal Dutch Airlines Building, New York City

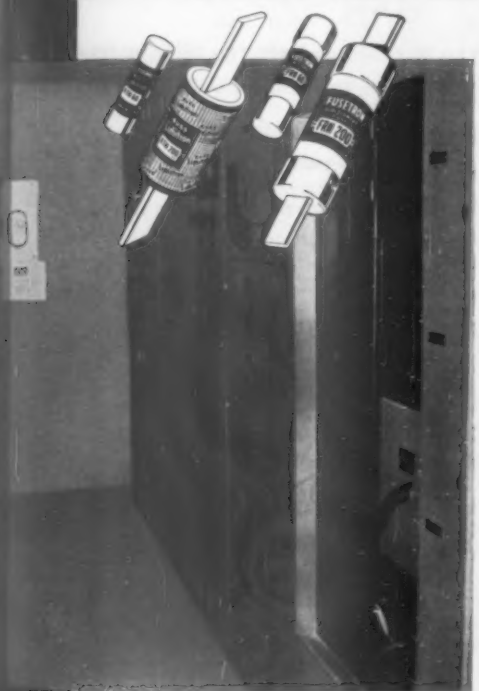
KLM INSTALLATION POINTS OUT THE NEED FOR SAFE INTERRUPTION OF HIGH FAULT CURRENTS

A 3 million dollar modernization program was recently completed on this 13 story office building at 609 Fifth Ave., which houses the American Executive and first floor ticket offices of KLM Royal Dutch Airlines.

To meet power requirements, the capacity of the electrical system was greatly increased, resulting in an estimated available fault current level approaching 100,000 amperes.

In the main switchboard, Buss LIMITRON fuses are installed to provide the high interrupting capacity necessitated by the available fault current and to give great current limitation needed to protect circuits and equipment.

To further assure safe protection and to safeguard against needless outages, distribution and feeder circuits are equipped with FUSETRON dual-element fuses.



Part of Main Switchboard Protected by:
3-3000 amp., 3-1200 amp., 6-1000 amp.,
BUSS LIMITRON FUSES and
15-400 amp., 3-350 amp., 3-275 amp.,
3-250 amp., 9-200 amp., 3-125 amp.,
3-90 amp.,
FUSETRON dual-element FUSES

Fuses Offer the Safest, Most Practical Solution to Modern Protection Requirements

As electrical network capacities increase, available fault currents of 75,000 to 100,000 amps and up are no longer uncommon.

In order to adequately safeguard circuits and equipment, it becomes imperative to install protective devices that can safely interrupt these fault currents.

HIGH INTERRUPTING CAPACITY

Fuses provide high interrupting capacity at a very low cost. Buss LIMITRON fuses have an interrupting rating of 200,000 amps. rms symmetrical — and for FUSETRON dual-element fuses it is 100,000 amps.

CURRENT LIMITATION

Buss LIMITRON fuses also provide current limitation so that fault currents are shut-off before equipment on the circuit can be damaged.

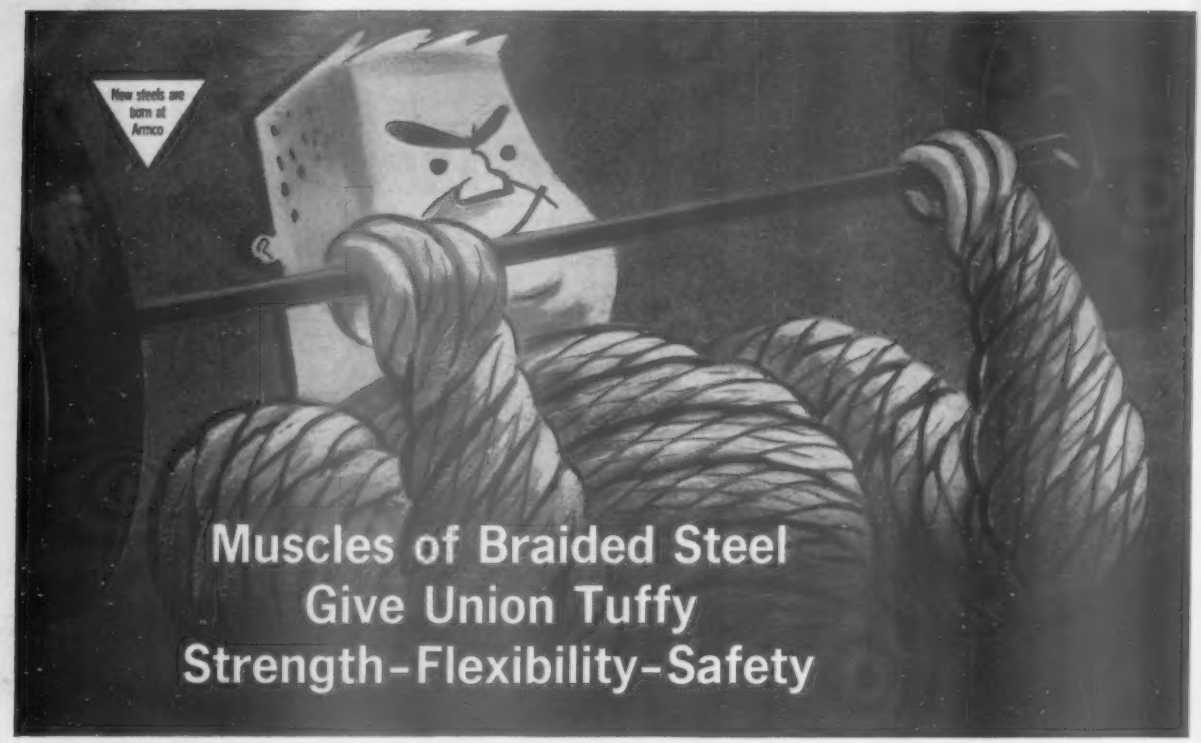
LIFE-TIME DEPENDABILITY

Fuses remain safe and accurate through the years. Fuses have no triggers, latches, pivots or contacts to stick or get out of order. They require no expensive maintenance or recalibration — they are always ready to function the instant trouble occurs.

To help you select the proper fuse, write for the new BUSS booklet . . .
BASIC PROTECTION FOR ELECTRICAL POWER SYSTEMS.

301

BUSSMANN MFG. DIVISION *McGraw-Edison Co.*
University at Jefferson, St. Louis 7, Mo.



Taking their cue from nature's arrangement of muscles, Union technicians perfected Union Tuffy Slings with a machine-braided wire fabric construction. The result —muscles of braided steel, so strong, so flexible they perform far beyond the ability of ordinary wire rope. So, for balanced power, safety and dependability, insist on the balanced team of Union Tuffy Slings and Union Wire Rope Tuffy Hoist Lines.

Four Other Union Wire Slings Help You Fill Any Need

In addition to famed Union Tuffy Slings, Union Wire Rope offers, in a full range of sizes:

1. Hand Braided six and eight-part slings.
2. Uni-ply—a flexible multi-part rope laid sling with pressed-on metal ferrule.
3. Press-Grip wire rope sling with pressed-on metal ferrule.
4. Uni-Grip wire rope sling with return loop splice and pressed-on metal ferrule.

Union Wire Rope Tuffy Tips on safe use of Slings and Hoist Lines

Hoists vs. Hernia

Proper hoists cost less than hospitalization. A manufacturer said recently 75% of his compensation claims were connected with hernia. The Ohio Bureau of Workmen's Compensation estimated the average hernia claim at $750. Said a safety magazine: ("Hoists) with proper attention will help substantially in reducing back injuries and hernia claims by reducing the strain on workers."

Free! Two Valuable Tuffy Handbooks

1. "Tuffy Tips." Gives many other safety hints. Tells how to break in and properly use wire ropes and slings. Chock-full of do's and don'ts to save money, assure better service.

2. "Tuffy Sling Handbook." Helpful data on the selection and use of slings —types, dimensions, weights, fittings, rated loads, safety-approved signals.

Write Union Wire Rope, Armco Steel Corporation, 2234 Manchester Ave., Kansas City 26, Missouri.

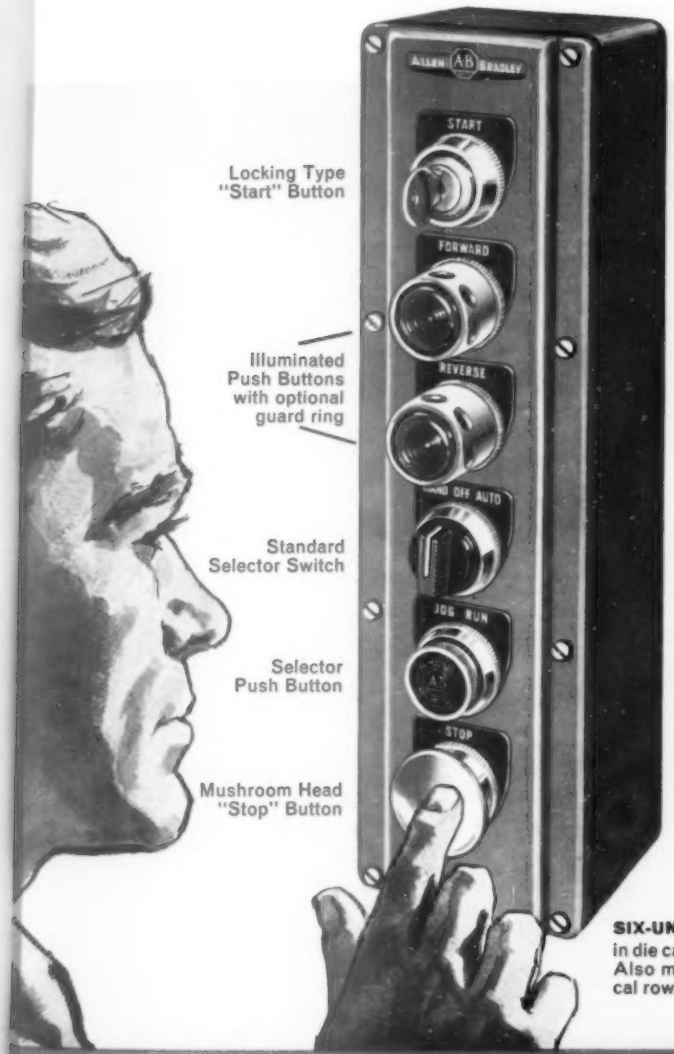
ARMCO Union Wire Rope

BE SURE YOU GET

Quality Appearance Quality Operation

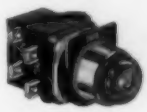
Specify Allen-Bradley's line of ***OILTIGHT CONTROL STATIONS***

Allen-Bradley oiltight units and stations harmonize with the trim lines of modern machine tools —they look as if they were a part of the machine. Also, from the wide selection of control units, you'll be able to satisfy every operating requirement. A-B control units are positively oiltight—impossible for oils and cutting fluids to foul the contacts. And the silver contacts assure reliable operation. The rugged construction and generous wiring room of all A-B stations are valued by the installation engineer. Insist on Allen-Bradley pilot control units and stations—you can't make a mistake! Send for Publication 6090.

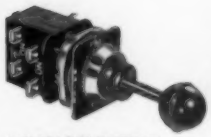


FLUSH HEAD
push button, also made with extended head.

WING LEVER PUSH BUTTON
Combines push button and selector switch.



PUSH-TO-TEST PILOT LIGHT
Six different color lenses available.

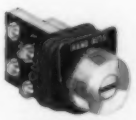


4-WAY SELECTOR SWITCH
Also furnished for 2-way operation.

PILOT LIGHT
Transformer or full voltage types.

DOUBLE CIRCUIT
Has 2 N.O. or 2 N.C. sets of contacts.

PILOT LIGHT CLUSTER
Four lights of different colors in one unit.



SELECTOR SWITCH
With coin slot operator. Other operators available.

CONVENIENCE RECEPTACLE
For plugging in work light or small tools.

SPECIAL CONTROL CONSOLES
can be furnished to meet your exact operating requirements.

SIX-UNIT CONTROL STATION
in die cast aluminum housing. Also made with up to 4 vertical rows with 4 units per row.

7-61-RM

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

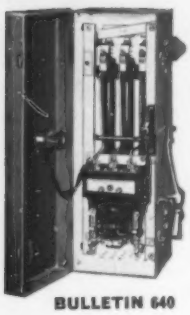
Where Reduced Voltage Motor Starting is Necessary...

Allen-Bradley has the best and most complete answer

No matter what your reason for reduced voltage motor starting may be, Allen-Bradley has the *right* starter. Not only can the power company's requirements be satisfied exactly, but the A-B starter will at the same time provide the best possible starting conditions for the motor and the driven load. At least one of the starters described below will completely satisfy your operating requirements. For more detailed information, send for Publication 6088.

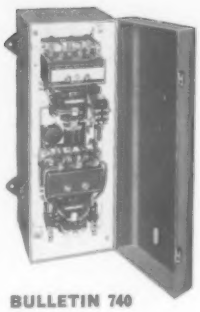
AUTOMATIC AUTOTRANSFORMER starter for squirrel cage motors that should not be started at full voltage. The autotransformer reduces line voltage during acceleration. Taps permit adjustment of voltage applied to the motor.

BULLETIN 748



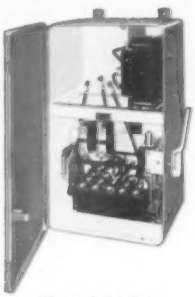
MANUAL STEPLESS RESISTANCE starter has graphite compression disc resistors for velvet smooth starting of squirrel cage motors. Starting of the motor is under the complete control of the operator.

BULLETIN 640



AUTOMATIC RESISTANCE starter has graphite resistors automatically inserted in series with the squirrel cage motor at starting. Resistors can easily be adjusted to motor and load conditions, giving velvet smooth acceleration.

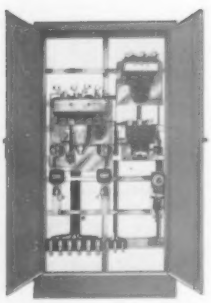
BULLETIN 740



MANUAL AUTO-TRANSFORMER starter for use where load conditions or power company rules require reduced voltage starting. The air break starter shown has double break, silver alloy contacts.

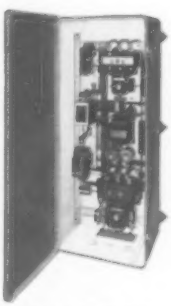
BULLETIN 646

AUTOMATIC MULTIPOINT RESISTANCE starter for use on network systems. Resistors inserted at starting are cut out in definite steps. Time intervals adjustable to provide velvet smooth starting.



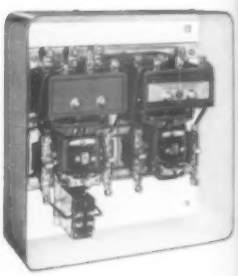
BULLETIN 741

AUTOMATIC STEPLESS RESISTANCE starter is not equalled for velvet smooth motor acceleration. It will satisfy any power company requirement. Eliminates lamp flicker on networks used for power and lighting.



BULLETIN 742

AUTOMATIC PART WINDING starter for use with squirrel cage motors having two separate parallel windings. Made in two-step type, and three-step type with resistance connected in the line on the first step.



BULLETIN 736

7-61-RM

ALLEN-BRADLEY

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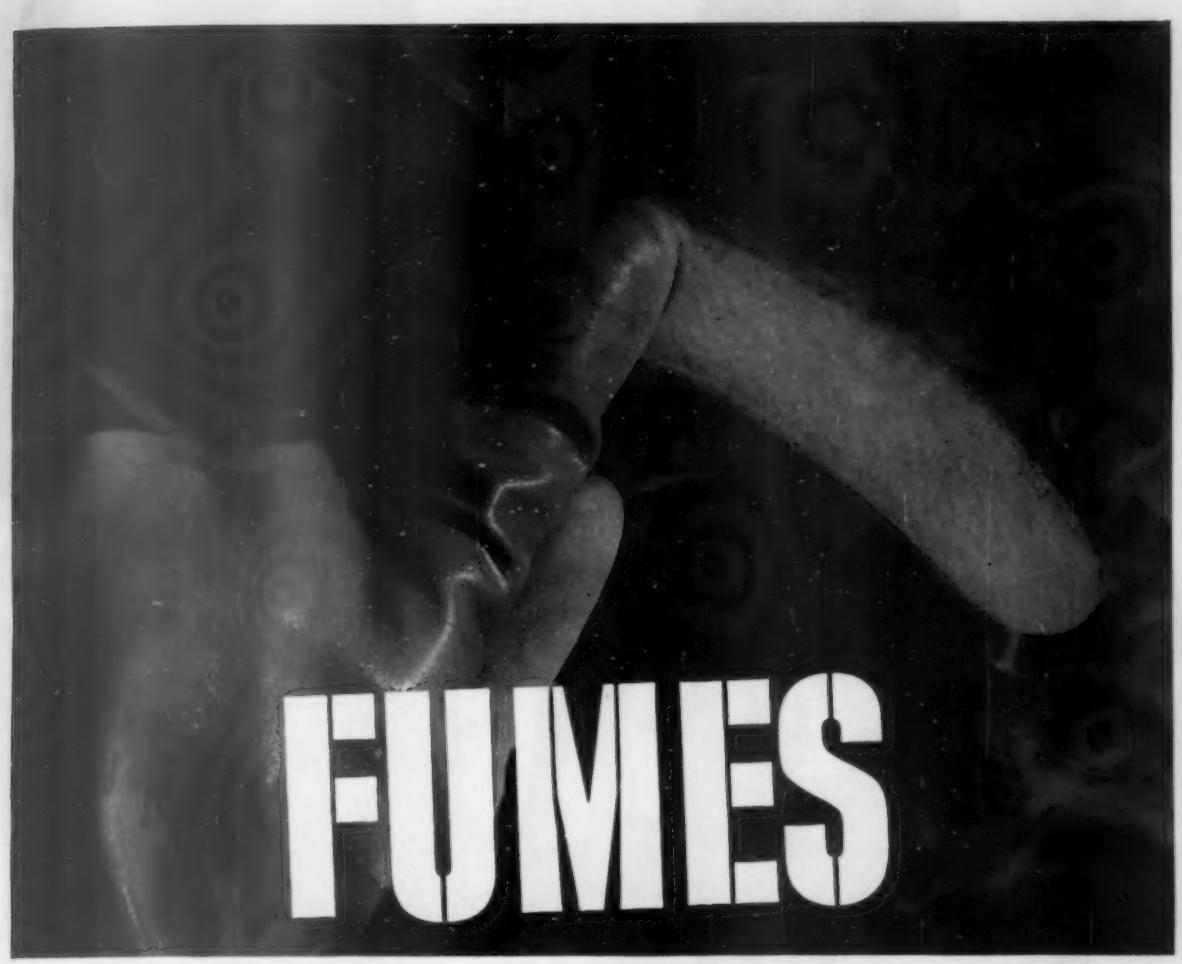
Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL



WHEN THE PROBLEM CALLS FOR PAINT THE BEST ANSWER

IS INVARIABLY **Barreled Sunlight** ENGINEERED Paints

Take a look at the effect process fumes have on painted surfaces in your plant. Unsightly discoloration marks their presence. Next comes corrosion that can tear the hide off the toughest building material and send your maintenance budget "up in smoke".

Before this happens, however, you can take steps to end this costly deterioration. Your first move is to call in a Barreled Sunlight Engineered Paint representative. This man *knows* how paints react to various industrial fumes. He knows which paints best withstand their yellowing and corrosive action. He can also show you — with an "on-the-wall" demonstration — how Barreled Sunlight Paints save on application costs, go on faster and easier with fewer coats.

Give this man an opportunity to help solve *your* specific paint maintenance problem. The coupon below will put him in touch with you promptly and without obligation.

FREE! BARRELED SUNLIGHT PAINT "SLIDE GUIDE"

Contains complete information on Barreled Sunlight Exterior and Interior Finishes, Colors, Primers, and Thinners plus full application and special resistance data.

BARRELED SUNLIGHT PAINT COMPANY
124-C Georgia Avenue, Providence 5, Rhode Island

I want help in selecting the right paint for a specific job in our plant.

☐ Please have your representative call me to arrange an appointment without obligation.

☐ Please send me your new "Slide Guide" to Barreled Sunlight Paints.

Name.....

Title.....

Company.....

Street.....

City.....*Zone*.....*State*.....

The logic of placing your safety eyewear

business with the man from MSA...

A COMPLETE VISION PROTECTION PROGRAM

- **A.** Full line of eye and face protection for wide selection
- **B.** Convenient cross-country stocking points for ready availability
- **C.** Safety eyewear prescription service for corrective-protective lenses
- **D.** Modern vision testing methods for valid, reliable results

You can count on a complete vision protection program, including Rx service, when you place your safety eyewear business with the man from MSA. This single source of safety eyewear service answers every program requirement. A wide selection of optional features makes this program even more attractive.

To help you determine how this service can benefit you, two new publications are now available: *The M-S-A Eye and Face Protection Catalog*, and *The M-S-A® Sightgard Prescription Safety Eyewear Program Booklet.* Please write us for your free copies.

MINE SAFETY APPLIANCES COMPANY · Pittsburgh 8, Pennsylvania MSA

MSA backs up its label with selection, quality, research, experience

For more facts Circle 410 on Reader Service Card

Sylvania's 2'-wide Troffers provide attractive, glare-free lighting in the general and private offices. Sylvania's pendant and surface-mounted fixtures illuminate other building areas.

With Sylvania's Very High Output Fixtures..... PRECISION

The moment you enter this brand new Robertshaw-Fulton plant at New Stanton, Pa., you realize the detailed planning that went into its design and construction.

This one immense production area (740′ long x 300′ wide) now handles the facilities of the Robertshaw Thermostat Division formerly housed in three separate plants. Modern conveniences and surroundings aid plant and office employees to turn out precision products at top efficiency under ideal working conditions.

One of the major factors in creating this excellent working atmosphere is the lighting throughout the building. In the production areas over 1500 Sylvania very high

Robertshaw Thermostat Division of
Robertshaw-Fulton Controls Co., New Stanton, Pa.
Engineers and Constructors—
The Rust Engineering Co., Pittsburgh, Pa.
Electrical Contractor—
Allegheny Industrial Electrical Co., Inc., Pittsburgh, Pa.

222,000 square feet of production space in the Robertshaw-Fulton plant at New Stanton, Pa., receive over 120 fc. of lighting from more than 1500 Sylvania Very High Output fixtures. Mounting height-17 ft., spacing-20 ft.

LIGHTING AIDS PRECISION PRODUCTION

at new plant of Robertshaw-Fulton

output fixtures with 1500 ma lamps provide 120 foot-candles of even comfortable illumination.

The general office, cafeteria and private offices utilize Sylvania's 2'-wide Troffers with diffuse glassware shielding for pleasant, glare-free lighting.

Still other parts of the building use different Sylvania lighting equipment. The lobby and reception area features Sylva-Lume, one of Sylvania's modular lighting systems. In the Research Department Sylvania's Tartan fixtures provide the right answer. And in certain low-ceilinged areas the choice was Sylvania's shallow surface-mounted Mohawk fixtures.

The modern combination of plant and office facilities at Robertshaw-Fulton illustrates the ability of Sylvania's broad fixture line to provide the *right* kind of lighting equipment for *any* situation.

When you have a lighting problem, whether large or small, don't limit your choice. Call on Sylvania and select the lighting equipment that suits your exact needs. A Sylvania lighting specialist will be glad to help you with your lighting problems.

SYLVANIA LIGHTING PRODUCTS
A Division of SYLVANIA ELECTRIC PRODUCTS, INC.
One 48th Street, Wheeling, W. Va.

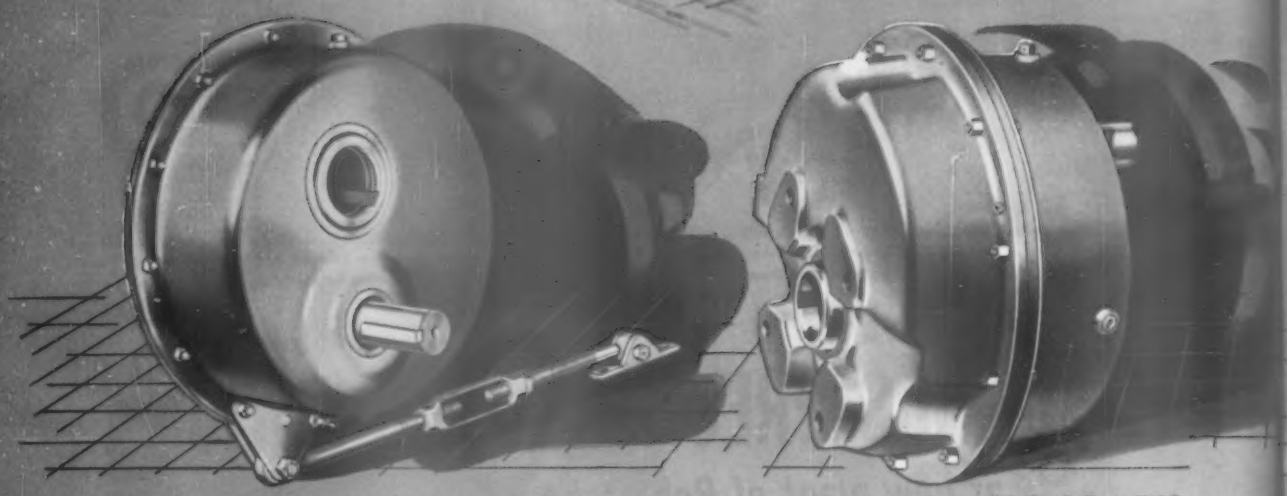
SYLVANIA

Subsidiary of **GENERAL TELEPHONE & ELECTRONICS**

For more facts Circle 411 on Reader Service Card

FALK

A GOOD NAME IN INDUSTRY



Ask for Bulletin 7100

Ask for Bulletin 7100

147 COMBINATIONS . . . horizontal or vertical applications . . .

UNIT SIZE	SHAFT MOUNTED DRIVES					
	RATIOS			MOTOR MOUNT	OVERLOAD RELEASE	BACK-STOP
	4	14	24*			
107J	X	X	X	X	X	X
115J	X	X	X	X	X	X
203J	X	X	X	X	X	X
207J	X	X	X	X	X	X
215J	X	X	X	X	X	X
307J	X	X	X	X	X	X
315J	X	X	X	X	X	X
407J		X	X	X	X	X
415J		X	X	X	X	X
507J		X	X	X	X	X

½ to 125 hp. Up to 100,000 lb-in. torque

UNIT SIZE	FLANGE MOUNTED DRIVES					
	RATIOS				BACK-STOP	MOTOR MOUNT
	4	9	14	24*		
107J	X	X	X	X	X	X
115J	X	X	X	X	X	X
203J	X	X	X	X	X	X
207J	X	X	X	X	X	X
215J	X	X	X	X	X	X
307J	X	X	X	X	X	X
315J	X		X	X	X	X
407J			X	X	X	X
415J			X	X	X	X
507J			X	X	X	X

*20:1 ratio for sizes 107 and 115

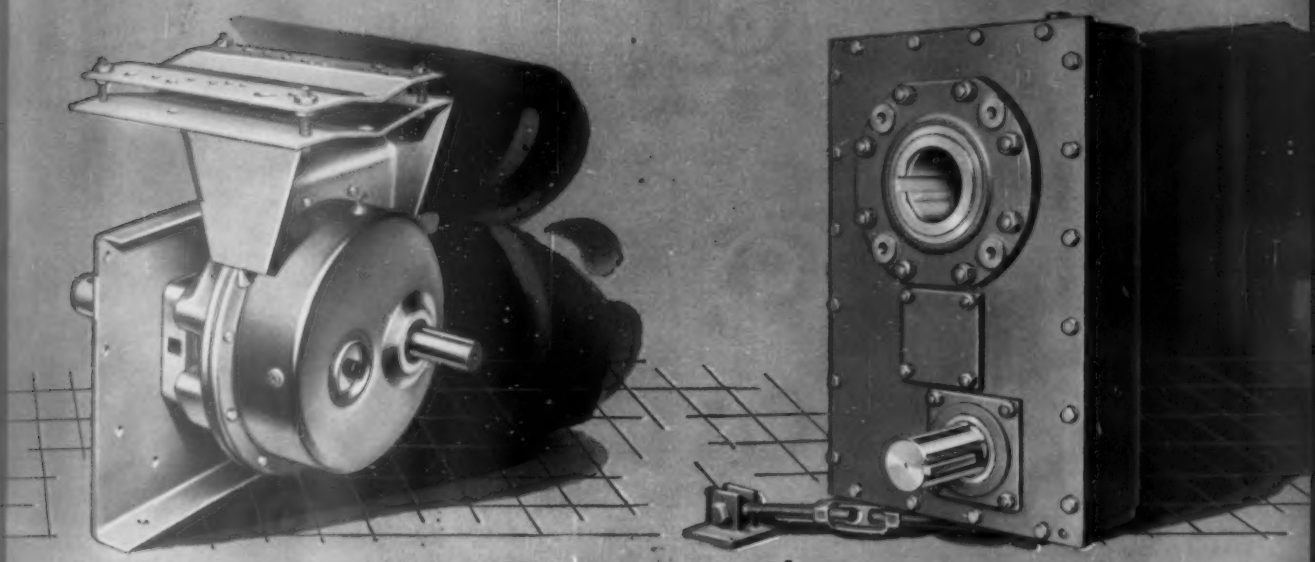
½ to 125 hp. Up to 100,000 lb-in.

Exclusively **FALK**... *Adaptability of all these three types of Falk Drives for use with Equi-Poised Motor Mount.* **This feature reduces costs of engineering and constructing motor bases and foundations.**

Exclusively **FALK**... *Interchangeable rotating elements* **size-for-size between Shaft and Flange Mounted Drives or Screw Conveyor Drives. This feature simplifies stocking and maintenance for large users.**

the most complete line of SHAFT MOUNTED, FLANGE MOUNTED and SCREW CONVEYOR drives...

The line with the exclusive EQUI-POISED motor mount



Ask for Bulletin 7106

. . . AVAILABLE FROM STOCK

UNIT SIZE	SCREW CONVEYOR DRIVES				
	RATIOS				MOTOR MOUNT
	4	9	14	24*	
107J	X	X	X	X	X
115J	X	X	X	X	X
203J	X	X	X	X	X
207J	X	X	X	X	X
215J	X	X	X	X	X
307J	X	X	X	X	X
315J	X		X	X	X
407J			X	X	X
415J					
507J					

½ to 40 hp. Up to 44,000 lb-in. torque

Exclusively **FALK**... *Single helical gears* used in *all* sizes and types—they provide maximum (98½%) efficiency per gear mesh.

FALK is a registered trademark

New 2 LARGER SIZES OF SHAFT MOUNTED DRIVES—415-507

Falk-designed and Falk-built for higher torque requirements, these all-steel, *helical* gear reducers are available in Shaft and Flange Mounted Drive design.

TWO RATIOS, 15:1 and 25:1
HORSEPOWER RATINGS TO 125
TORQUE RATINGS TO 100,000 LB-IN.

Ask for Bulletin 7100.1 (Shaft and Flange Mounted Drives) or for Bulletin 7106.1 (Screw Conveyor Drives).

THE FALK CORPORATION
MILWAUKEE 1, WISCONSIN

Manufacturers of Quality Gear Drives and Flexible Shaft Couplings

Representatives and Distributors in most principal cities

A POINT TO PONDER.. when you need gear drives or shaft couplings of "FALK OR EQUAL" quality, where but from Falk can you get the "OR EQUAL"?

For more facts Circle 412 on Reader Service Card

for strength, economy, durability

Steel

New **ECONO-BEAM** Guardrail

Four splice bolts and one post bolt are only fasteners required to connect sections and hold to post.

Workmen install a 25-foot length of ECONO-BEAM Guardrail in an industrial parking lot. It is strong, yet light in weight.

Saves Money Without Sacrificing Safety

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ARMCO **Drainage & Metal Products**

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If you have a maintenance problem you'd like to discuss with an expert, there's a man like Herb Norton in *your* area. To meet him, just call your nearest Du Pont district sales office. Or write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. F-13 Wilmington 98, Delaware.

* * *

Herbert L. Norton came to Du Pont's Finishes Division in 1939, having studied chemical engineering at the Georgia School of Technology. As he added experience, increased responsibilities kept pace. Currently, Herb is Southeastern District Manager, Industrial Maintenance Sales. His background includes problem-solving in such areas of industry as textile, paper, petroleum, food, marine and public utilities.

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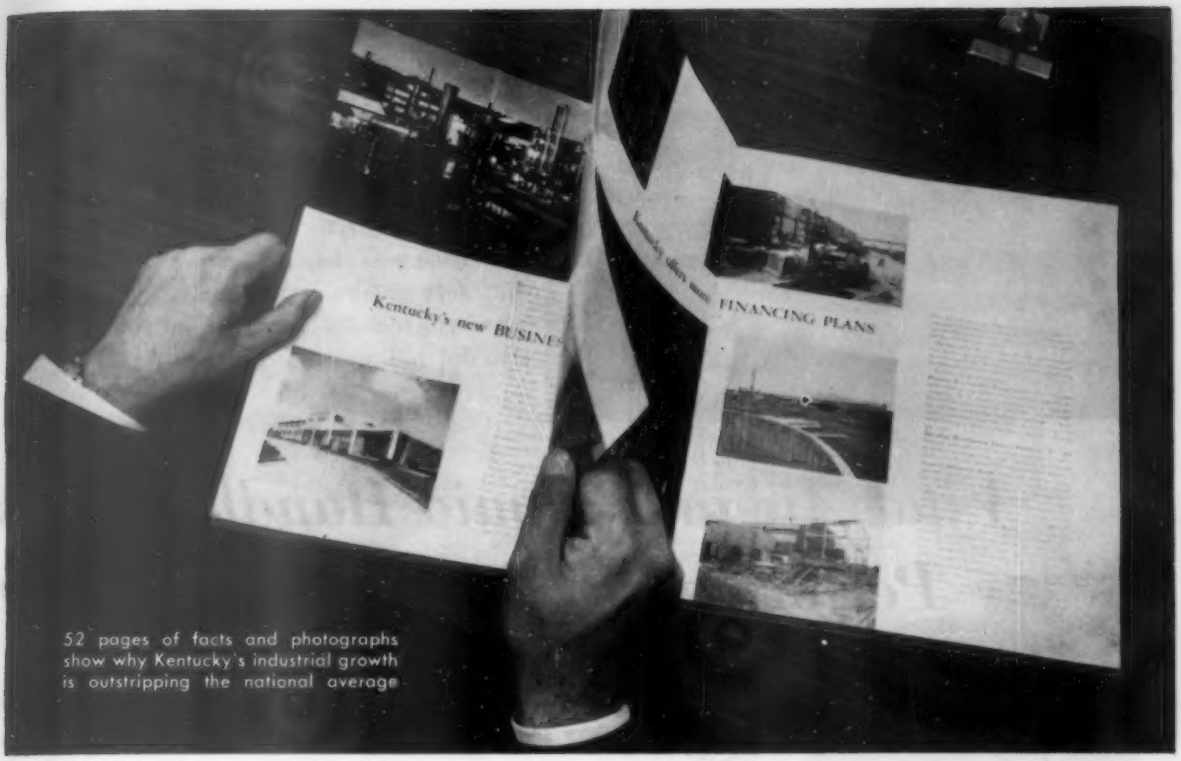

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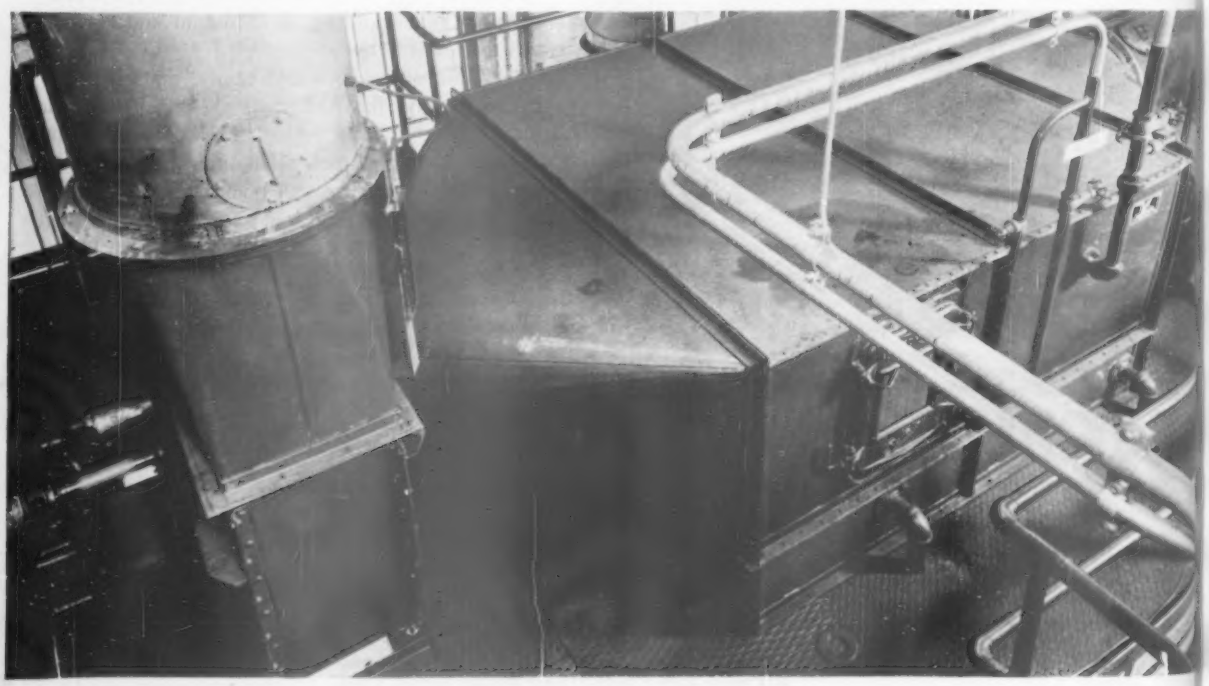
'Buffalo' Gas Absorber



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'Buffalo' Type BLH Fan

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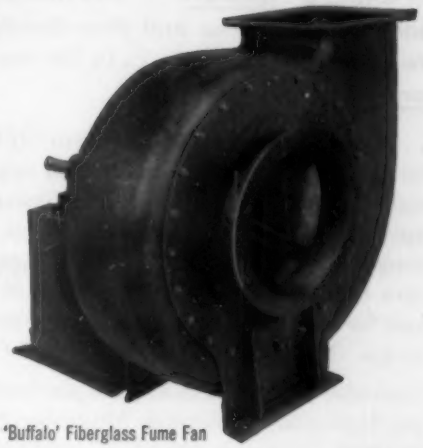

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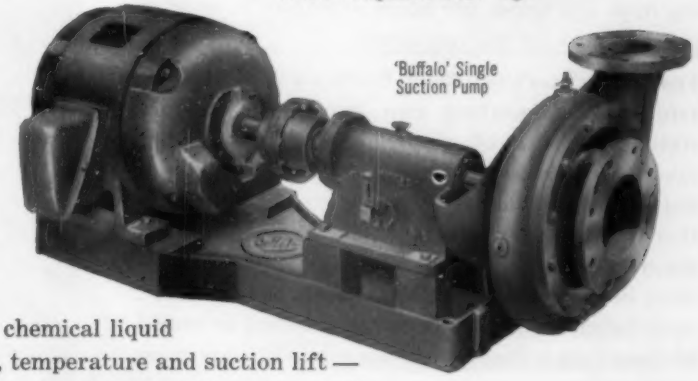

'Buffalo' Single Suction Pump

BUFFALO FORGE COMPANY

Air Handling Division—Buffalo Pumps Division

Buffalo, New York

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. . . for example, a $2.50 per hour lift truck operator uses one door three times each hour during an eight-hour day. Each time, he must leave his vehicle, open the door, walk back to his vehicle . . . drive through, stop . . . walk back to the door, close it, return to his vehicle. This takes about 90 seconds . . . and he has to return through the door, so that makes three minutes for the complete cycle.

3 minutes per cycle . . . 3 cycles per hour . . . 8 hours per day equals 72 minutes. Multiplied by 200 working days this totals 240 hours at $2.50 . . . or $600 per year just for walking labor!

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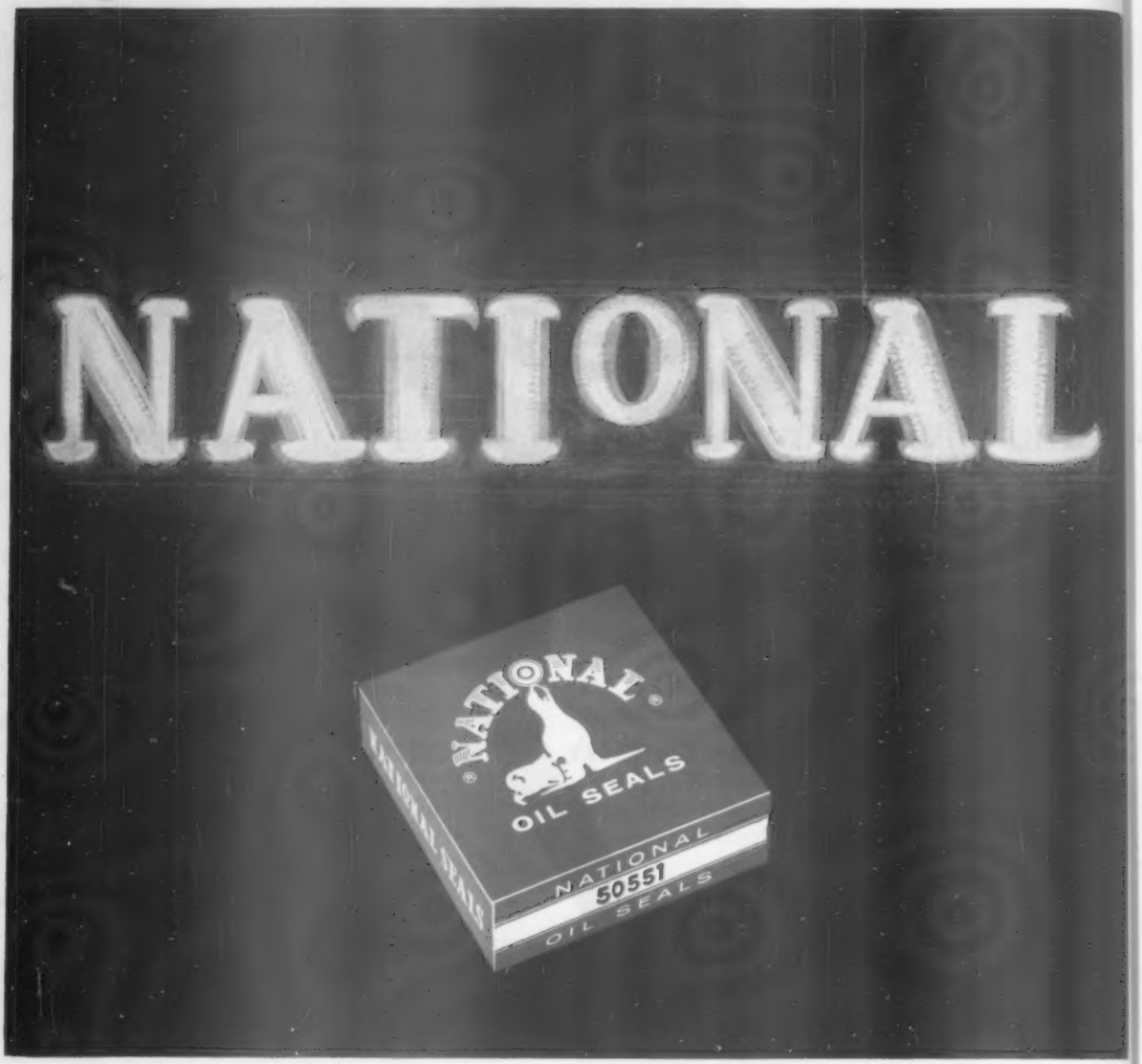

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FACTORY PRESS TIME REPORT • MARCH 1961

Looking ahead in business

For some reassurance in the midst of today's murky business outlook, economists suggest we turn to recently released government figures on the economy's performance in 1960. The facts reveal an underlying strength that should be recalled when less encouraging business indicators are received.

The Commerce Department recently announced that the gross national product climbed to a record $503-billion in 1960. Significantly, the total increase, $21-billion, was achieved despite some letdown in economic activity in the latter half of the year.

•

Still, signs of business's current doldrums cannot be shrugged off.

For example, factory output again dropped off in January. The Index of Industrial Production was down one point to 102 for the month. And personal income again declined.

But, noting the economy's basic strength, you can look beyond the present lull in economic activity. And when optimists see another record business year, their predictions appear more realistic.

Machinery has already been set in motion to prop up sagging sectors of the nation's economy. Chiefly, it takes the form of government actions recently proposed by President Kennedy. The construction industry, for example, received heavy emphasis.

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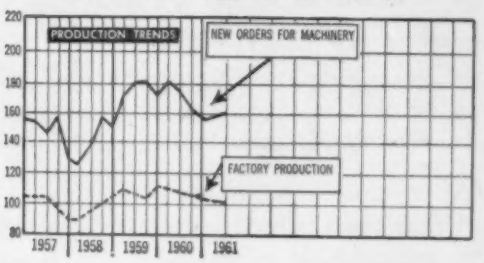
To increase housing construction activity, Mr. Kennedy has taken steps to increase the supply and reduce the cost of money available to finance home construction. And he has called for a speed-up in urban renewal activities, for which federal aid is provided. He has also made additional funds available for state highway construction programs.

The President has asked Congress to adopt legislation extending unemployment insurance to workers who have exhausted their original claims. If Congress acts favorably on this proposal, more than half-a-million workers unemployed for lengthy periods will again receive benefits. And their hoped-for added spending could give the economy a quick boost.

FACTORY FIGURES OF THE MONTH



Indicator	JAN.[P] 1961	DEC.[r] 1960	JAN. 1960
New Orders for Machinery (exc. elec.)[1]	166.0	159.0	172.0
Contracts for Industrial Construction[2]	163.0	190.0	129.0
Factory Production[3]	101.0	103.0	112.0
Consumers' Prices (cost of living)[4]	127.6	127.5	125.4
Industrial Prices (materials, supplies)[4]	128.1	127.9	128.8
Manufacturing Employment (millions)[4]	15.6	15.8	16.5
Total Employment (millions)[5]	64.4	66.0	64.0
Unemployment (millions)[5]	3.4	4.5	4.1

[P] = preliminary [r] = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1957 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Labor, Bureau of Labor Statistics.

Some of the President's proposals may not get immediate results. This is particularly true of his attempt to boost the economy by increasing the volume of home-construction activity. For, while the Administration can effectively increase the volume of financing available to the home-construction industry, it cannot be sure that builders will be prepared to step up their activities.

Finding needed financing is a time-consuming task even when Washington is encouraging new building. And time also is required to recruit work forces and prepare building sites.

Nevertheless, government actions appear to indicate that the recent slump in home building will gradually reverse. Home construction should aid rather than retard general business activity as 1961 progresses. An upturn in activity in this area is one good reason for expecting over-all business to improve during the months ahead.

Leads to read and save

THIS FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve your current operating problems. Here's how it works:

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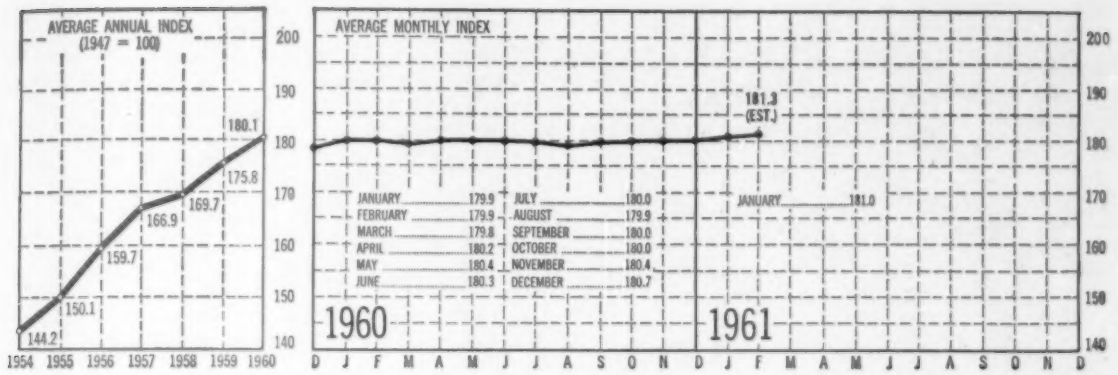
FACTORY PRESS TIME REPORT • MARCH 1961

Cost index of plant maintenance



The climb starts

True to form, maintenance costs inch up as 1961 begins. The trend will continue.

On the strength of gains posted in materials prices, FACTORY's Cost Index of Plant Maintenance opened the new year on the upswing. The index rose 0.3 of a point to 181 during January. Labor costs were unchanged during the same period.

Throughout most of 1960, materials prices were decidedly weak. Then, in January, prices firmed up a bit. Is this the beginning of a trend, or just a monthly variation? No absolutely positive answer can be given. But the chances are good that materials prices will march higher this year. Industrial prices usually foreshadow general business activity, and most business analysts believe that business will start upward before summer.

Here's a review of cost activity in January:

In the building and facilities component, materials costs were up 1.1 points. A 12.3-point hike in the index of roofing prices set the pace. In addition, the index for electrical control panels and switches rose 2.1 points, and paint 1.9 points. Price cuts actually outnumbered rises, but most declines were confined to a fraction of a point so the net effect was small.

In the equipment index the story is similar. There were fewer price changes, but the most heavily weighted items were up, carrying the index of materials prices 0.3 of a point higher in January. A gain of 2.1 points was chalked up by electrical controls. Mechanics' hand tools rose 0.7 of a point. On the down side in the equipment index were non-ferrous metals, off 3.5 points, and valves and fittings, down 0.5 of a point.

	AVERAGE 1960	JAN. (Preliminary)	DEC. (Revised)
Building and Facilities Index	170.6	172.8	171.5
Materials	140.1	138.6	137.5
Brick	154.9	155.5	155.5
Elec. fixtures	131.9	130.9	130.9
Elec. switches, boards, fuses	183.3	182.7	180.6
Elec. wire, copper	147.0	136.7	139.0
Glass	148.1	147.7	147.7
Gutters, spouts, ducts	180.3	180.4	180.4
Gypsum products	140.9	142.7	140.9
Heating equipment	125.5	121.4	123.3
Lumber	128.7	121.2	121.9
Millwork	156.7	155.4	155.6
Paint	130.2	133.4	131.5
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.7	188.7	188.7
Pipe & tubing, copper	151.5	117.7	119.9
Roofing	113.9	121.5	113.2
Sanitary fixtures	162.4	161.8	161.8
Sash, metal frame trim	137.4	136.9	136.8
Solder	122.5	120.4	122.8
Steel, structural	236.3	236.3	236.3
Tanks, steel	139.6	138.4	139.2
Valves & fittings	167.8	163.1	163.6
Wire mesh	163.8	162.9	165.5
Labor	191.0	194.2	194.2
Carpenters	177.3	180.9	180.9
Electricians	199.4	202.2	202.2
Painters	196.2	199.5	199.5
Equipment Index	184.2	184.8	184.7
Materials	177.6	178.0	177.7
Abrasives	157.9	157.3	157.9
Alloys, non-ferrous	123.2	117.7	121.0
Bars & plate, steel	227.2	227.2	227.2
Bearings	160.0	155.4	155.4
Belting	160.9	164.2	164.2
Bolts, nuts & screws	225.2	236.4	236.0
Chain	187.4	193.8	193.8
Controls (electrical)	183.3	182.7	180.6
Gear-reduction units	181.1	174.5	174.5
Hand tools, mechanics	204.5	205.5	204.8
Lubricants	125.7	125.7	125.7
Motors	145.0	142.5	142.5
Non-ferrous metals	135.8	126.8	130.3
Precision tools	158.2	158.2	158.2
Pumps	235.4	196.6	196.6
Tools, cutting	186.8	187.8	187.8
Valves & fittings	167.8	163.1	163.6
Labor	188.7	189.4	189.4
All mfg. labor	185.1	187.6	187.6
Machine tool labor	192.1	191.2	191.2
FACTORY'S COST INDEX	180.1	181.0	180.7

Looking ahead in labor

Automation is expected to cut deep into industrial jobs later this year—if and when the recession ends. Union leaders fear thousands of laid-off workers won't be recalled when business picks up.

A new survey reveals the toll already taken by automation. Assembled by the House Labor Committee, the report lists totals of jobs permanently lost: autos, 160,000; steel, 100,000; electrical, 80,000; coal, 200,000; oil, 10,000; chemical, 13,000.

Threat of more job losses on the way is forcing a shift in labor's 1961 bargaining strategy. This year union negotiators will concentrate on:

• **Supplementary unemployment benefits through weekly payments to the jobless.** Though not generally recognized as such, the SUB plans now working in the auto and steel industries are high-priced automation pacts where employers are required to help support laid-off employees for periods up to 52 weeks.

• **Extended health and welfare benefits for laid-off workers.** Unions will demand that benefits be carried for longer periods while workers are off the payroll. Last year's steel pact started the trend.

• **Earlier pensions for dollar workers.** Unions will push for goal at age 60, instead of the current practice of paying pensions when a worker reaches 65. This is aimed at taking more workers out of the labor force to provide needed jobs.

Attracting less attention from negotiators will be:

• **The shorter work week.** This goal may be achieved slowly, in smaller negotiations, but there will be no major breakthrough in 1961.

• **Big wage demands.** Negotiated settlements are likely to run lower than the average 8-cent deferred pay boost that will be paid out this year. Higher pay will be traded for jobs or benefit-protection plans.

These automation reports have apparently hit home with Labor Secretary Arthur J. Goldberg. Top aides say he ordered a special automation study group formed within the department. FACTORY will carry a special report on this group as details unfold.

President Kennedy has a roster of new labor experts at work on the nagging issues of labor-management relations. The change in administrations has been rapid—much faster than first anticipated. The changes reach into all government areas where labor and management have a vested interest:

• **For labor disputes,** a new mediator and conciliation director, William E. Simkin. A 54-year-old professional arbitrator and close associate of labor expert George Taylor, Simkin has been an arbitrator in the steel, can, and clothing industries.

• **For pre-strike relations,** Kennedy appointed Frank W. McCulloch as chairman of the National Labor Relations Board. McCulloch, 55, has been a longtime assistant to Senator Paul Douglas (D-Ill.). Kennedy will fill another NLRB post this month when Member Joseph A. Jenkins resigns.

• **For the "featherbedding" work-rules dispute,** Kennedy named a new chairman of the presidential railroad commission previously headed by James P. Mitchell. This commission, which reports in 1962, is expected to set guide lines on how to handle the work-rules issue.

•

An inter-union squabble is stirring over imports from foreign producers. A handful of specialist unions—garment, glass, pottery, plastics, and others—have traditionally fought for higher tariffs.

The specialist unions and a few manufacturing locals are challenging the AFL-CIO's reciprocal trade policy, which favors free trade with foreign countries. These unions, hard-hit by unemployment, protest that foreign goods, particularly from Japan, are costing thousands of U.S. jobs.

Two groups, the Garment Workers and Local 1031 of the International Brotherhood of Electrical Workers in Chicago, are threatening a midsummer boycott against handling Japanese woolens and electronic parts. The International Association of Machinists Lodge 755 in San Diego is protesting the import of Japanese tools and dies for airplane parts.

(Read an exclusive report "The Big Strikes," p. 60)

SEE FACTORY'S NEW BI-MONTHLY DEPARTMENT, "ON STRIKE," P. 99

Ultimately, *somebody* has to get rid of "plant" dust, dirt, smoke and fumes. If the job is left up to workers or neighbors the cost to management is exorbitant. Worker morale and efficiency drops, neighborhood relations deteriorate and plant cleaning costs continually climb.

The modern (and thrifty) way to attack the problem is with AAF Dust Control applied at all dust sources. This way, dust is trapped the instant it is produced. It never has a chance to irritate workers, arouse neighborhood housewives or run up your own plant cleaning costs.

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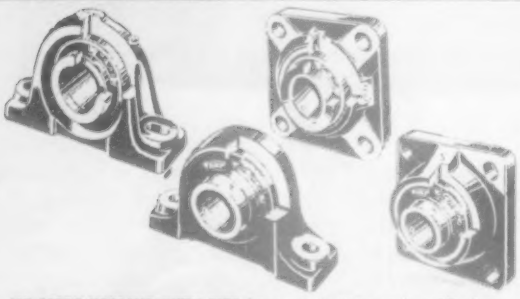
DISTRIBUTOR DAN, the SKF bearing man, shows how SKF PILLOW BLOCKS AND FLANGED MOUNTINGS eliminate 5 pesky maintenance problems



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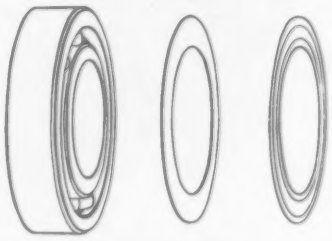
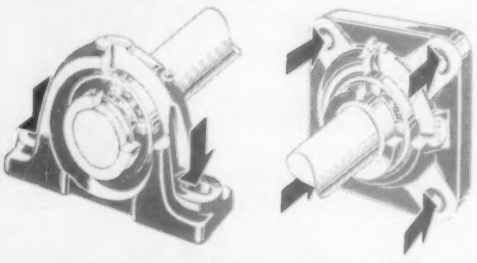
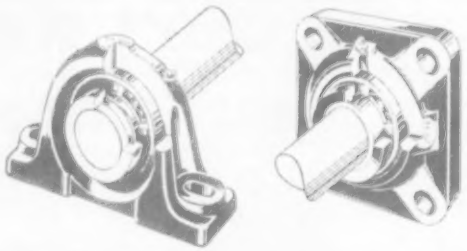


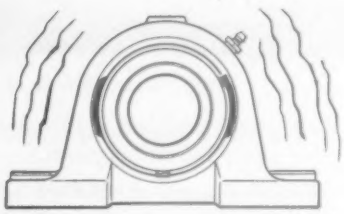
SOLVES SEALING PROBLEMS. Both units are prelubricated and equipped with seals that really seal. The red washer is made of tough, durable DuPont "Fairprene"—backed by a sturdy metal plate. Rotating flinger actually flings dirt away from the bearing.



EASILY INTERCHANGEABLE. You can quickly substitute SKF units for other worn-out or damaged mountings. Bolthole spacing and center heights are designed so that the units can be interchanged with other mountings of similar design.



MOUNTING MADE EASY. You can install these pillow blocks and flanged mountings in minutes! Because, the spherical outer ring provides easy initial alignment—compensates for misalignment. Separate locking collar and set screws ensure fast adjustment.



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FACTORY

Bitter lesson in price-fixing scandal

"Say it isn't so, Joe." That was the unvoiced prayer on the lips of thousands of management men last month. As baseball fans watched the dreary spectacle of the Black Sox scandal in 1919, so thousands of uneasy businessmen last month hoped against hope that federal charges of antitrust law violations against 29 electrical apparatus manufacturers would prove false. Unfortunately, the court found the charges to be true. The companies were assessed fines totaling millions of dollars. Worse still, several otherwise honest executives went to prison.

FACTORY applauds the renewed efforts of many of the companies to affirm their corporate integrity. For instance, Ralph Cordiner, chairman of General Electric Company, said, "We believe the antitrust laws should be vigorously enforced. It has been, and will continue to be, the company's policy to comply strictly with these laws, with no exception, compromise, or qualification." Mark Cresap, Jr., president of Westinghouse Electric Corporation, exhorted his managers to make the company's legal and ethical conduct code a "living policy in every action we perform." For any man to think he assists the corporation by engaging in acts contrary to that code, Mr. Cresap said, "is nothing but a delusion."

Outside the convicted companies, most management men were understandably reluctant to condemn those who used what at the least was poor judgment, what at the most was cynical expediency and moral lassitude. There are those, among whom FACTORY's editors are numbered, who feel that the incident underscores broad management problems for which there are no easy answers.

The price-fixing scandal arose in an industry where fixed costs in plant and equipment are unusually high. Inventories of equipment-in-process are costly, too. Furthermore, these products are of the type where quality, service, delivery, and other customer satisfaction measures are often more important than price. This situation is typical of the steel industry. Some of these factors also occur in heavy equipment, chemicals, and petroleum.

Management in this kind of unyielding situation faces difficult technical and moral challenges. On the one hand, corporate owners press for a wedge in the narrowing cost-price gap. Foreign competition on a price basis is growing. Tax relief or relaxed depreciation schedules do not appear in sight. To maintain a good rate of return on investment in plant and equipment in the face of price-cutting is almost impossible.

Management's solutions lie in the area of better management of plant operations. It must be vigorous in its search for improved methods of small-lot production, reduction of inventories-in-process, and shortening of manufacturing-cycle time. Above all, it cannot afford solutions that are not in the public interest.

L. R. Bittel

EDITOR-IN-CHIEF

Starting this month, and extending to the last day of the year, more than 30 major manufacturing-union contracts will expire. The strike shadow hangs heavy over many of these negotiations. Chances are you face the same ominous prospect. What's ahead then, as deadline dates draw near? Attempting to answer this question, three top men (photo, below) met in Chicago a few weeks ago. They aimed their know-how at your plant-level problems—first, at an American Management Association Personnel Conference, then in this exclusive interview. They exposed the lesson of

R. Heath Larry, USS *James W. Oram, PRR* *Philip D. Moore, G-E*

the big strikes

U.S. Steel, General Electric, the Pennsylvania Railroad—each one fought a different battle in three big strikes. Now, with you, they face a common future: Things will get worse before they get better.

The union is still a crafty, fast-moving adversary. Here's what you should know about that Chicago meeting and the future of the strike in American industry. —*By LAWRENCE F. MIHLON, Associate Editor,* FACTORY

On Feb. 8, 1961, a short, wiry man named James B. Carey shouted to a gathering in New York City: "The labor movement in America must return to the spirit of the thirties . . . strikes are necessary to the survival of labor and collective bargaining."

The man who longs for the return of those violent days is president of the International Union of Electrical Workers. IUE recently wound up on the short end of the strike stick when it was waved by Carey at General Electric Company.

On Feb. 14, 1961, Mr. Carey's arch-nemesis from G-E, Employee Relations Manager Philip D. Moore, met with R. Heath Larry, administrative vice president for labor relations, U. S. Steel Corporation, and James W. Oram, vice president of public and employee relations, Pennsylvania Railroad Company. They, too, had opinions about strikes and collective bargaining.

The three industry men talked about strike methods, issues, and personalities. They looked at the future. They were especially concerned with the tripartite (or Kaiser Steel) committee plan.

When the Jim Carey incident was related, a smile of expectation crossed each manager's face. When the smiles were gone, these words were left:

"In '59 and '60 the unions realized the honeymoon was over. They know now that it's no longer going to be easy. Hopeful of third party intervention favoring their aims, they'll go for more strikes and harder strikes. The United Auto Workers will put industry to the test during the summer."

Each manager spoke with authority and experience—experience gained largely through long, sometimes bitter, bargaining during the big strikes of 1960.

R. Heath Larry struggled through one of the most crippling steel strikes in the nation's history. For over 116 days—from late 1959 to early 1960—U. S. Steel acted as captain of the industry team battling the United Steelworkers of America. Though the classic economic issues were also at stake, the most controversial, according to many observers, was the insistence by steel that work rules be revised to eliminate featherbedding. The strike finally ended when former Vice President Richard M. Nixon and Labor Secretary James P. Mitchell intervened in the "public's behalf." Each side claimed victory, though post-mortems intimate that big steel took it on the chin. The strike cost both companies and workers billions in lost earnings, taxes, and profits. The industry has still not fully recovered.

James W. Oram rode out the first strike in 114 years to close down the Pennsylvania Railroad. Besides dangerously curtailing passenger and freight traffic throughout the eastern U. S., the strike deeply wounded the road's financial framework. Here, too, the big issue was work rules. That is, Mike Quill insisted that his transport workers be given first crack at all road maintenance work. The company retained the right to contract work out when it was more efficient and economical. Both sides in this conflict also laid claim to victory.

Philip D. Moore was a key manipulator of G-E's strike strategy during the latest attempt by IUE to close down the company's nationwide operations. Generally speaking, issues here were fairly logical and largely economic in nature. The G-E approach has been hailed as the method of the future. It's based on extensive research and planning over a period of years preceding the contract deadline. On the basis of this research the company made a proposal. It did not move far from this stand during negotiations. The strike ended when certain locals of the IUE refused to go along with Carey's recommendations to stay out. The settlement was favorable to G-E. The new contract eliminates the cost-of-living escalator, breaks the 12-month wage-increase cycle, and abolishes supplementary unemployment benefits in favor of a severance pay plan. Jim Carey himself has refused to sign the contract, leaving the gesture to his lieutenants. At that same meeting of Feb. 8, he vowed: "The strike isn't over yet."

METHODS

Considering that each manager faced a different union at different times, we asked how each one prepared for and handled the situation once it was under way.

Notably, each singled out his company's efforts in communications as the most significant factor in combating the strike (excluding, of course, bargaining-table in-fighting, which would fill volumes).

Lamenting the fact that steel hadn't started earlier, Heath Larry said communications efforts were greatly intensified at the first hint of a strike through newspaper ads, correspondence to non-union employee homes, radio appeals by supervisors. "The sooner you counter union communications efforts, the better off you are," Larry said.

Though the wisdom of the action was debated in company circles, Jim Oram depended almost entirely on public opinion to counter his strike. The Pennsylvania flooded eastern newspapers and television with ads stating the company's position. Oram said that in any strike against a public utility or basic industry the successful influencing of public opinion can make all the difference in gaining a satisfactory settlement.

General Electric methods are already legion. With an army of experts in economics, labor relations and communications, the company plans each and every contract many months, even years in advance. This preparation follows five steps, according to Phil Moore. First, thorough research of the issues and climate by labor *and* management. Second, a review of each party's findings. Third, adjustment of original findings as dictated by latest events up to proposal time. Fourth, statement of intent to be flexible only if new facts warrant it after talks are started. Fifth, day-after-day oral and written communications with employees. An effort is made to inform the employee of every move the company makes that could affect his welfare. This action is an integral part of everyday plant management.

But can it work, or is it practical for the company without the wealth of a General Electric, without the special people?

At this question Moore was incensed. "Perhaps the greatest misconception shared by other managements is that it takes great sums of money and rare skills to accomplish the G-E approach," he said.

"The big secret of G-E's method is time," Moore insisted.

"If management (regardless of plant size) has the desire to deal fairly with its employees, by candidly presenting the issues, he can apply the G-E method. Certainly, some

There is deep concern that the new administration may go too far in its many efforts to settle

the big strikes

before they injure the "public." Third-party intervention of any kind is viewed with suspicion.

QUIET in the mills signaled the big steel strike. U.S. Steel's Larry defends injection of work rules as strike issue.

special skills are needed. But they can be learned," he contended.

"Of course, this method takes considerably more work in the smaller plant, but it can be done."

At this point, big steel's Heath Larry commented:

"In our negotiations a big problem was the foremen. Too many of them were uncertain of their role in combating the strike. They felt that issues were for discussion in Washington or Pittsburgh offices—not on the mill floor."

Larry indicated that many foremen were afraid their rapport with the men would be injured if they discussed the issues. Those who did try, however, discovered after the strike that their good standing with the men was still intact.

The three men agreed that management is 'way behind in developing the foreman as the first line of defense against the strike. They urged sweeping training programs and self-help systems.

ISSUES

What has the big-strike school taught us about issues? Where should they appear in negotiations? What's ahead for plant management?

During the steel strike, observers questioned the wisdom of injecting the work rules issue into negotiations. Reflecting on this question now, U. S. Steel's Larry said the issue worked equally to the advantage or disadvantage of both sides in reaching a settlement. Speaking positively, Larry noted that injecting the issue caused many of his plant managers to take a new look at featherbedding. In the future, he suggested, unions will be more cautious about making this an issue in the plants.

To the Pennsylvania's Oram, the appearance of the "make work" issue in statements from both sides was definitely a healthy thing.

General Electric avoids this type of issue in its national bargaining because of its emotional impact. "This kind of thing is settled at the local plant level, wherever possible," Moore noted.

What about day-to-day issues (discipline, seniority, work assignments)—should they be inserted in company-wide contract bargaining procedures?

Here there was uncertainty. Moore believes in treating only economic problems during bargaining. He avoids day-to-day disputes. Larry said that when local everyday issues were inserted into the struggle they turned out to be industry-wide. If given a choice, he said, he would prefer to leave these issues to settlement at the local level in order not to "confound the hard bargaining sessions."

What issues will labor fire at plant men tomorrow?

There was agreement here—to a degree. Greatest pressure will come in the broad area of employment security. Wages will be used merely as a front for bitter in-fighting over plant location, automation displacement, and work rules.

"The trouble is, when it comes time to working out a plan for aiding the worker displaced by modernization, it's tough to identify who's been laid off for what reason," observed Heath Larry. He said that except in rare cases of particular machines obviating the need for certain jobs, it's difficult to tell just why a specific person left.

The three men agreed that management must do more to provide retraining and relocation opportunities for employees. "But," said railroad man Oram, "the unions will have to relax their utilization restrictions a lot more before we can do a complete job."

One of the mysteries of the G-E settlement with the IUE was the union's rejection of a company retraining proposal. In Philip Moore's opinion, "Mr. Carey did a great disservice to his members by this

VIOLENCE marked IUE's 1960 strike against G-E. Company's Moore insists good communications helped end strike.

PARALYSIS of entire PRR system came when TWU struck. Road's Jim Oram says public opinion turned tide in this one.

action." Moore figures the pressures imposed by the union's own seniority rules caused Carey to back away from a good thing.

PERSONALITIES

What role does the labor leader personality play in the strike?

Plenty, was the unanimous answer.

As long as the unions allow one- or two-man rule, without proper rank-and-file representation, and as long as the personality exists that thrives on conflict to justify his high position, the strike will remain an ominous, sometimes indiscriminate weapon.

What kind of personality is most dangerous in the strike school?

Certainly not the outspoken, raucous type, who generally tips his hand by loudly announcing his intentions. Be wary of the one who *politely* gives you a hard time.

THE THIRD PARTY

What role should a third party assume in strike situations?

Contrary to the tripartite commission plan monopolizing the headlines today, Messrs. Larry, Oram, and Moore echoed a resounding "no dice" vote. Their unrehearsed chorus demanded more explanation.

The Kaiser Steel commission introduces as its third party a non-government representative of the "public." In this case, the "public" spokesman is Dr. George W. Taylor of the University of Pennsylvania. A much-educated labor scholar, Dr. Taylor headed former President Eisenhower's fact-finding team during the big steel strike. As the "public" spokesman, he has the right to make non-binding recommendations. Under that plan, labor and management would meet no later than 60 days before contract expiration. The "public" member would be called in 30 days before deadline. The tripartite would then be empowered to act as private consultants to either side, as mediators, or as go-betweens to exchange information and to issue public reports.

The Kennedy team favors a similar (21-man) commission and faster intervention, in the person of Labor Secretary Goldberg, where strikes threaten national welfare.

Combining the individual reactions of Larry, Oram, and Moore, a quote something like this is the result: "Interference by a third party —government, public, or otherwise —during negotiations only contaminates free collective bargaining. Either we have a free system or we have a controlled system."

If we assume intervention (government) will favor labor during the next few years, Heath Larry feels "political power gains may become more important than settlement."

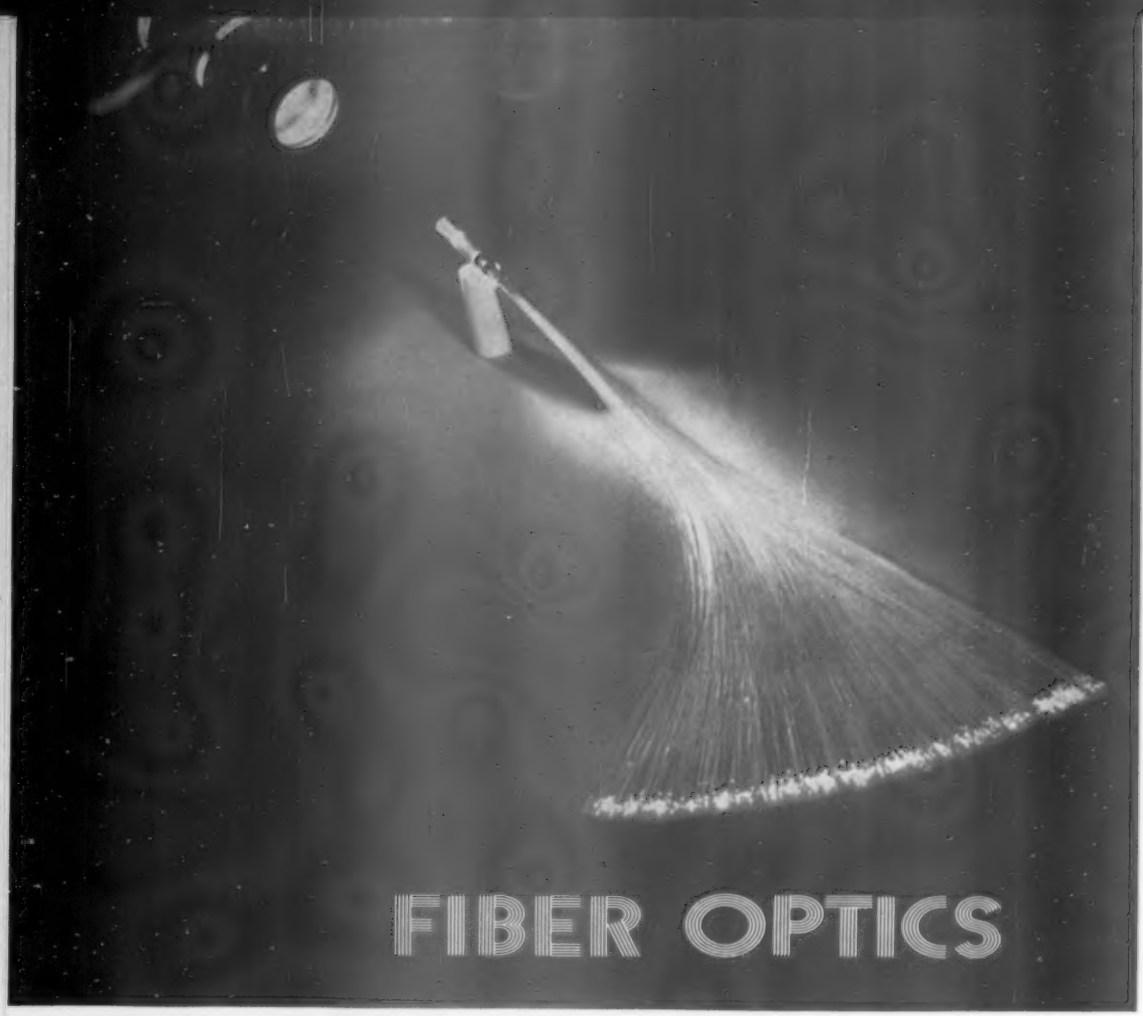
THE FUTURE

What's ahead then as we enter the strike school of the sixties?

Spurred on by either real or imagined aid from Washington, labor will go for more strikes and tougher strikes. You can expect unions to take every advantage of your weaknesses in employment security plans. Look for more concentrated attempts to intimidate you long before the contract deadline.

The only dissenter to the prediction that strikes will be harder was Jim Oram. Having just emerged, somewhat deflated, from the Goldberg-settled New York tug strike, he said: "We may have more strikes, but they'll be over a lot faster."

Popular as it appears on the surface right now, don't expect too many companies to agree to the tripartite plan—Kaiser- or Kennedy-sponsored. As our three managers put it: "It'll be years before progress is made in this direction. Perhaps more accurately put, industry may never be ready for intervention *of any kind.*"



FIBER OPTICS

Yesterday a scientific curiosity, today a useful tool to ease and speed your plant jobs. Though three big companies are hot on the trail, your own imagination will find new ways to use these pipes that bend light around corners.

A few months ago, at a continuous process plant north of New York, a large boiler creaked, sputtered, stopped dead.

Maintenance crews scurried about searching for the trouble. Every minute the boiler remained down, big money and crucial project time were lost. Last year, the tank would have been cut open. Not this time.

Instead a long snake-like tube was worked through a small opening and into the boiler's troubled belly. Outside the tank a technician peered into the tube. What he saw pinpointed the trouble. Soon after the boiler was under way again.

By LAWRENCE F. MIHLON
Associate Editor, FACTORY

The tube that let the technician see around corners is called a fiberscope. Inside its flexible metal casing are thousands of optical glass fibers like those you see above.

The remarkable properties and potential of these minute glass rods may herald a new era in plant operations. With little fanfare they're already at work solving problems in quality control, assembly, maintenance. Here's what it's all about.

IT WORKS LIKE THIS

When light shines on the end of a glass rod, much of the light entering the shaft bounces from wall to wall, finally emerging at the other end. The process at work here is called total internal reflection. (See drawing on facing page.)

This same reflection process occurs even when the rod is drawn to a very small diameter. Most fibers used today are 0.002 to 0.003 inches in diameter. The smaller the diameter, of course, the more flexible the rod becomes; an advantage sought in an instrument like the one used to probe the boiler failure.

If optical fibers are arranged in a bundle, they transmit an image from one end of the bundle to the other, regardless of the path the bundle must follow. They do it by breaking the image up into separate light components, one for each fiber. Close inspection of the transmitted image reveals a kind of dot pattern not

unlike a newspaper halftone (panel, far right). An 8 or 16mm camera lens then transforms the dots into a distinct picture.

As long as the bundled fibers are arranged in the same way at each end, the image is a true one. Disarrangement at one end will scramble or distort the received image.

Though orderly array is necessary at each end for good image transmission, the fibers need not be orderly en route. Thus, it is conceivable that a glass fiber bundle could be spread out flat under a rug and still carry an image back to the receiver end.

When a tight bundle is formed to give a high-quality picture, the close proximity of the fibers to one another causes light to leak from one fiber to the next. Fiber makers solve this by coating each fiber with a transparent jacket. The coating, having a lower index of refraction than the glass rod, contains the light traveling through the rod.

Each fiber rod is made from high-quality bar-stock glass. The glass is milk-white and free from stones or bubbles. Plastics have been tried, but have proved inefficient transmitters at long lengths.

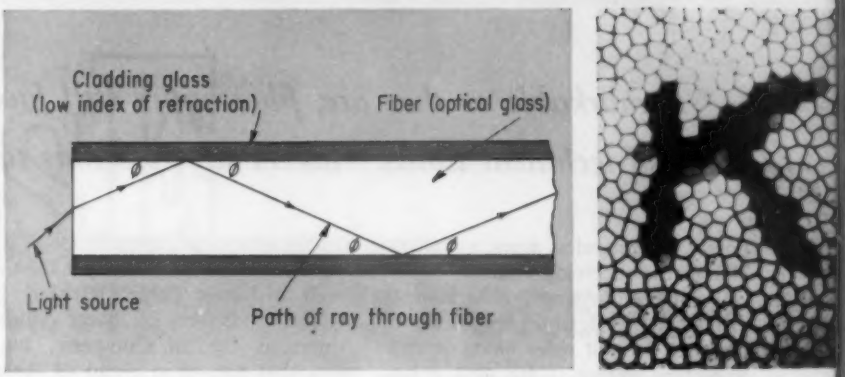
Glass fibers can also be made into loose bundles simply to carry light from one point to another over tortuous paths. Or they can be fused into various rigid shapes for use in cathode ray tubes and other optical-electronic instruments.

A glass fiber probe (right, bottom) is failproof. It has no moving parts or electronic components to go awry. The flexible fiber bundle is virtually indestructible as long as it remains inside its protective casing. It can withstand temperatures of up to 800 F.

THESE JOBS TODAY

At this writing, fiber optics are being used in:

• Quality control. At Westinghouse Electric Corporation's Chestwick, Pa., plant, a flexible fiberscope is being used for internal inspection of big "canned" pumps. Made by the American Optical Company, the probe gains entry into the pump casing through a small external volute. As the scope winds its way through the various passages, a bulb at the top (its wiring runs the length of the casing) lights the way. Light



LIGHT PATH through glass fiber, showing total internal reflection, is drawn above, left. **MAGNIFIED IMAGE**, right, shows dot pattern of the fiber picture.

UNCLAD BUNDLE, above, shows how the fibers carry light around corners. If the fibers are arranged the same way at each end, a definite image picture is formed.

FLEXIBLE FIBERSCOPE, held below by American Optical's W. P. Siegmund, allows visual internal inspection of bent pipe. Cutaway shows right angle prism, mounted over lens, and tiny light bulb. Bulb's wiring from black box runs inside casing.

Remarkable as they are, fiber optics still face production problems and technical limits. Makers say solutions to both are on the way.

power is generated from a battery box at the receiving end.

• Production assembly. At a western plant, a flexible fiberscope is attached to and rides along with a miniature welder. Until now, it has been almost impossible to check these internal welds while being made. Poor welds couldn't be detected until the piece underwent slow, highly expensive test procedures.

• Research. At AC Spark Plug Division of General Motors Corporation, a flexible fiberscope is employed to study the internal operation of a car's fuel tank.

THESE JOBS TOMORROW

Just around the corner, experts see optical fibers being applied to these plant problems:

• Closed circuit TV communications. W. B. Karkow, manager of advanced projects, Chicago Aerial Industries, points to fiber optics' ability to separate an image. He predicts a TV system that will take a basic image from a camera and transmit parts of the picture to several different receivers around the plant. For example, a data panel that contains information for several departments. Instead of receiving an overall relatively fuzzy image, an observer sees only an enlarged picture of the panel section that interests him. The system would work by fusing an optical fiber plate just behind the first cathode ray tube face. Here the picture is dissected. A secondary image vidicon or orthocon would then carry the dissected image to the other receivers.

• Plant security. As mentioned earlier, an optical fiber bundle has the ability to distort or scramble an image—if the fibers are not arranged the same way at each end. Using this ability, an employee's signature or even his physical likeness can be scrambled and reproduced on his ID card just as a jumbled mass of dots. A master "image transducer" unscrambles the dot pattern—revealing the real name and identity of the card holder.

• Operations monitoring. Since a flexible fiberscope, complete with its own light source, is no larger than a small hydraulic cable, Richard J. Wilson, manager of fiber optics, American Optical Company, suggests that one or a group of these units be inserted in areas too small to permit cameras or elaborate electronic equipment. Observers could monitor operations by eye, or the fiber tubes could be hooked into a TV system. For example, the fibers' high-temperature resistance could be used for visual monitoring of a boiler flame.

Remarkable as they are, fiber bundles still face production problems and technical limitations.

Perhaps the biggest hitch is cost. A ¼-in. diameter fiberscope of up to 12.5 feet in length, complete with viewing lens system, can cost over $3500 a unit. As the viewing diameter increases above ¼ inch, so does the price. The bigger the diameter, the greater the number of expensively produced fibers in the bundle.

Says American Optical's Dick Wilson: "Right now, only real need determines use or justifies cost."

Certainly, as more uses are found, more buyers will emerge. To meet the demand, fiber optics' makers are just beginning small production lines. AO, for example, is prepared to handle any volume order on the standard 36-in. flexible fiberscope. Generally, however, the state of the art is just leaving the research stage.

Big-volume production might develop more slowly than predicted. The failproof, indestructible quality of fiber optics is the reason. "How do you develop a replacement market, if the thing you sell never fails?" one producer laments.

TECHNICAL LIMITS

There are technical limitations: It's a physical fact that every 7 feet, half the light carried by a glass rod is lost. Thus, until research proves otherwise, good image carrying bundles cannot exceed 25 feet in length. Rigid optical attachments are available, though, that will stretch this length by 4 feet or more. Non-image carrying, loose bundles can be effective light transmitters in lengths up to 150 feet, report some experts.

So far, no one has figured a practical, reliable way to control the business end of a flexible fiberscope. At present an observer can only "jiggle" his scope into viewing position. AC Spark Plug, Westinghouse, and American Optical are all working on control mechanisms.

According to AO's Wilson, one advanced solution to this control problem might be a panoramic scope attachment similar to those used by the Germans on U-boat periscopes. Possibly made of molded plastic, this device would transmit a 360-deg. image. In the center would be a magnified spot showing a particular location on the horizon. The head would rotate slowly on power from a small motor in the operator's hand.

Also troubling fiber optics developers are lens focusing and image projection size. At the moment, the fiberscope must be pre-focused. Expected soon from manufacturers is a remote focusing system.

Not so optimistic is the prospect for increasing the basic image size as originally carried by the fiber bundle. Right now it's postage stamp size. Magnified any larger, without complicated electronics, the picture loses definition.

About the best that can be hoped for right now, say the experts, is a basic image of 3x3 inches. But this is more than acceptable, considering the job a fiber bundle can do.

For more information about fiber optics contact:

American Optical Company, Southbridge, Mass.

Bausch & Lomb Optical Company, Rochester, N.Y.

Chicago Aerial Industries, Barrington, Ill.

Mosaic Fabrications, Inc., Southbridge, Mass.

INCREASE MAINTENANCE FOREMEN

DECREASE MAINTENANCE COST

One way to decrease unit maintenance cost—provided the rest of your maintenance house is in order—is to add more supervisors. In our case, the net savings are over $50,000 a year.

General Electric's Silicone Products Department consists of over 200,000 square feet in 18 buildings. We operate around the clock, seven days per week.

About 25% of the maintenance personnel do operating maintenance on a four-turn schedule. The other 75% are within the maintenance and utilities unit, and represent such crafts as plumbers and steamfitters, machine repairmen, welders, carpenters, instrument repairmen, insulators, oilers, and electrical repairmen.

For a number of years our maintenance department has been pursuing a 12-point improvement program:

1. Organization
2. Maintenance cost improvements as regards . . .
   - Definition of maintenance
   - Preventive maintenance
   - Corrective maintenance
   - Major overhaul procedures
   - Development of standard practices
   - Improving plant equipment
3. Maintenance cost control as regards . . .
   - Budgeting
   - Accounting procedures—direct costing
   - Accounting of throughput and investment per maintenance dollar
4. Planning and scheduling
5. Work order system
6. Equipment records
7. Material stores
8. Manpower control
9. Planning plant shutdowns
10. Training—hourly craftsmen and maintenance foremen
11. Measurement systems
12. Long-range planning

The areas of organization, manpower control, training of maintenance foremen, and measurements were primarily affected in the action discussed here. The maintenance organization, as it was constituted during early 1959, prior to our program, is shown in Fig. 1 (page 68). We had 59 craftsmen reporting to three maintenance and service foremen. Five of the hourly personnel were working group leaders, and were considered the highest skilled men in their crafts. Each of these group leaders spent about three-quarters of his time laying out the work for his group. They performed or assisted on jobs the rest of the time.

This arrangement was not without its problems. Group leaders not only laid out work, but also set the work pace for their men. They sometimes acted as communications barriers, too. They didn't identify themselves with management, tended to resist making or accepting changes. And they weakened the worker-manager relationship.

The maintenance foreman's role was primarily reduced to (1) scheduling work as received through the group leaders, (2) expediting maintenance materials, (3) contacting maintenance "customers" for their requirements, and (4) subcontracting overflow work. In the remaining time, the maintenance foreman had to supervise both his own and the subcontractor's personnel.

The supervision density was analyzed, and we found that each maintenance foreman was supervising 19.6 hourly personnel. When we compared our own mainte-

By JOSEPH C. MOGAVERO
Manager, Maintenance and Utilities
Silicone Products Department
General Electric Company, Waterford, N. Y.

. . . Increase maintenance foremen and decrease maintenance costs—this is how G-E's Silicone Products Department achieved the startling savings indicated here.

nance-foremen supervision density with that of 14 other companies, we found that chemical plants in general averaged 10 to 11 craftsmen per foreman. Our department not only averaged 19.6 internal personnel, but each foreman also had to supervise some of the subcontractors' people. We decided our maintenance foremen were being spread too thin for effective supervision.

The plan we recommended to management consisted of (1) eliminating maintenance group leaders, (2) increasing maintenance supervision density, and (3) initiating a limited second-shift maintenance operation. Two maintenance foremen would be added, and the total hourly group increased by 9 to 68. (The new organization plan is shown in Fig. 2 on the opposite page.) This proposal was approved by higher management in the expectation that maintenance cost would be reduced by $30,000.

Maintenance foremen were selected from among the group leaders, and were trained one at a time. They were placed on salary without any line responsibilities for six weeks' training. The training program consisted of:

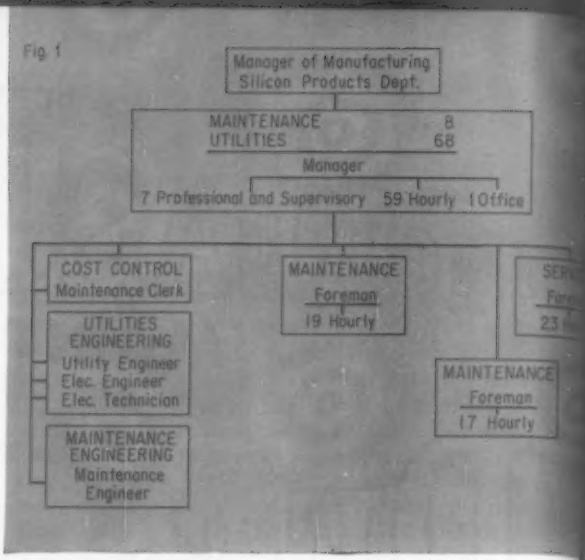
COURSE	HOURS	INSTRUCTOR
Foremanship fundamentals	60	Manager—maintenance and utilities
Foremen's safety training	32	Safety engineer
First aid	12	Plant nurse
Manufacturing fundamentals	120	Six unit managers

Each was given individual training for two to four hours a day, and observed experienced maintenance foremen in action the rest of the time. After the first foreman was trained, he was given line responsibility and the organization was changed. This cycle was repeated with the second man.

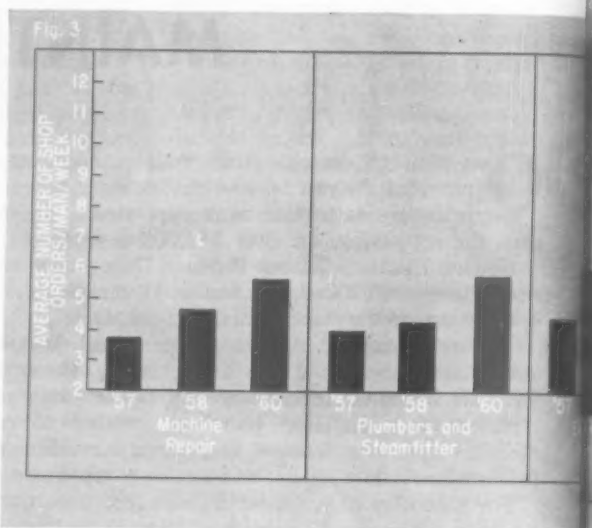
After four months of operation at the higher maintenance supervision density, manufacturing operations' managers were asked to submit their appraisal of the results obtained. Their response—summed up as follows—was gratifying:

- Quality of maintenance work had improved.
- Maintenance was helping management do a better job of meeting scheduling commitments.
- Equipment downtime had decreased.
- Productivity in the Pilot Plant had increased, because small equipment changes were made on the second shift, thereby decreasing the cycle time on new product experiments.

In addition to these qualitative reports, we gathered

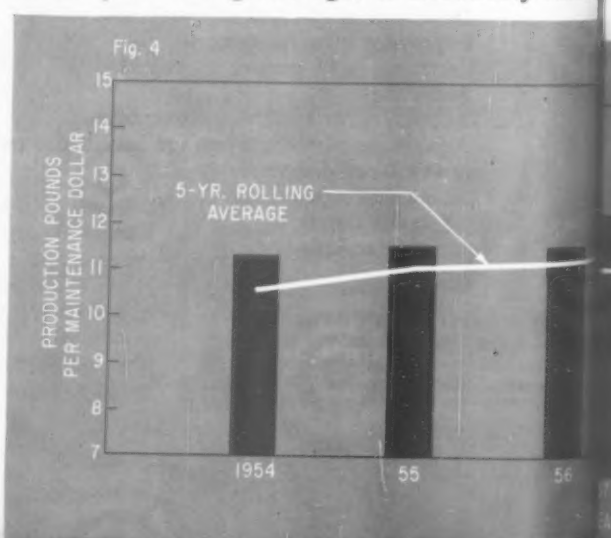


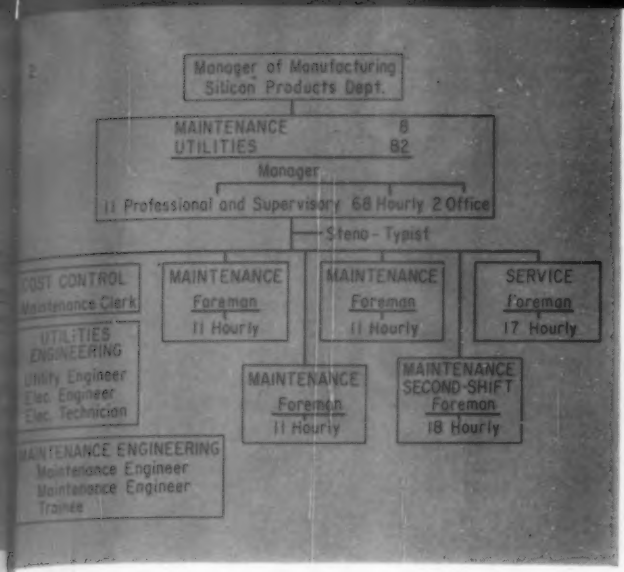
The old maintenance set-up looked like this...



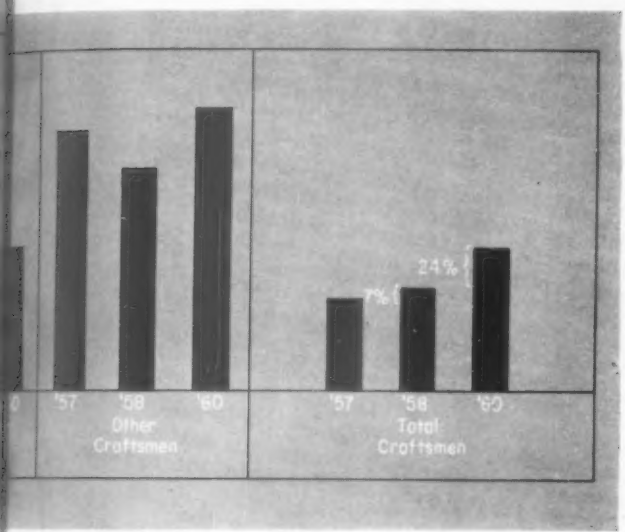
a 24% increase in maintenance shop orders

this 5-year rolling average, it effectively raised



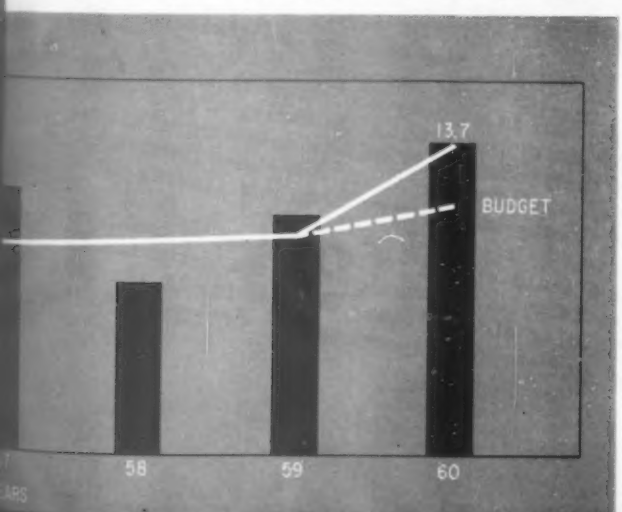


and changing it to the above produced . . .



per man, per week. As you can see from . . .

production output per maintenance dollar.



quantitative data on a 10-week average of the "before" and "after" conditions in the department. These data are tabulated below:

	Before	After 4 mo.	% Change	After 12 mo.	% Change
Craft overtime hrs./wk.	98	51	Down 48	22	Down 77
Other overtime hrs./wk.	112	79	Down 29	57	Down 49
Average no. of craftsmen	22.6	24.6	Up 9	32	Up 43
Average total hourly craftsmen	57.8	59.5	Up 3	65	Up 13
No. of foremen	3	5	Up 67	5	Up 67
Supervision density	19.6:1	12.0:1	Up 40	13:1	Up 33
Average backlog/wk.	282	245	Down 13	230	Down 18
Shop orders completed/man/wk.	5.4	6.6	Up 23	6.7	Up 24

One measurement of maintenance productivity is the change in shop orders completed per man, per week (Fig. 3). In 1958, the manufacturing units placed planners in their organization, but maintenance did not. These planners obtained production control schedules and they in turn made detailed weekly schedules for each factory process. They also submitted weekly schedules of the maintenance requirements of their processing equipment. The introduction of this scheduling resulted in a 7% improvement.

Later, our higher maintenance supervision density improved shop order activity by another 24%. (There was no appreciable change in technique or process improvement between the two periods.)

Another measurement used in our operation is the pounds of production produced per dollar of maintenance. The results of this measurement are shown in Fig. 4. This chart indicates wide fluctuations through the years. (Factors that may influence this over-all measurement are recession years, high production years, maintenance deferral years, and years when major process innovations are introduced.) However, by taking a five-year "rolling average," the trend line yields an indication of effectiveness. This five-year rolling average by itself predicted at least 12.0 pounds/per dollar of maintenance. But—recognizing that some improvement in effectiveness would be achieved in 1960—the maintenance budget was fixed at 12.5 pounds per dollar of maintenance.

Actually, the year-end figures showed nearly 14 pounds per dollar even though the October strike curtailed our production and maintenance activity. On a unit factory-cost basis, the maintenance cost has been reduced by well over 10%. However, it is not possible to prove conclusively that this total savings was achieved solely by the implementation of the above plan of action, since other factors—production improvements, engineering innovations, etc.—were also at work.

Nevertheless, we were able to satisfy the Cost Reduction Council of the Silicon Products Department that our savings from the supervisor-density program alone amounted (conservatively) to $50,000—almost twice what we expected. And next year should bring further improvements. Conclusion: A higher maintenance foreman density (10 or 11 to 1) did result in better labor utilization and higher maintenance productivity.

THE INFORMATION MESS—PART 2

In August 1960, FACTORY brought you a special report on one of the most pervasive problems facing American industry—The Information Mess. Here is one of the penetrating letters we've received in reply. It questions a basic assumption of data processing and suggests some changes. We feel it deserves wide consideration. Marginal comments are by Associate Editor Roger Christian, who authored the original report.

Western Reserve University
School of Business
Cleveland 6, Ohio

Mr. Roger W. Christian
Associate Editor
FACTORY
330 West 42nd Street
New York 36, New York

Dear Mr. Christian:

Your article on Controlled Plant Information (Aug. '60) made a strong case for an integrated data system. While I can't quarrel with the idea of incorporating the control information needs of a plant with those used throughout the rest of the company, I've found in many years of working in, and consulting with industry, that not one but two distinct systems are needed.

There are really two languages in organizational communications ... one dealing with capital investment--including raw and finished goods inventory--which keeps track of past, or accomplished costs. The other--the manufacturing control "loop"--deals basically with estimates, assumed productivity, and the feedback of actual results as they occur.

This second system is dealing hour by hour with an experiment, with its emphasis on variations. The crucial feature of this (or any) system must be its ability to cope with evolutionary forces.

Good!

After all, every production schedule is tentative. It must incorporate the certainty of variations and later adjustments as improvements, changes in methods, innovations, stock shortages, breakdowns, "crash jobs", etc. are fed into the system.

The manufacturing information system is therefore entirely foreign to the capital management system, which is essentially static, and deals with established costs. In fact, it's probably not logically supportable to use the capital management system as a check on the work of manufacturing management. To judge them solely in terms of net dollars contributed to overall profits is to measure them by only one dimension, when in fact their work has many dimensions and goes far beyond putting so many pieces per day into finished inventory.

Another problem that comes up often is the fact that systems designers seem to always assume--in error--that there is ONE figure for the productivity of a particular work station. So they try to find it so they can store it in the system for later play back, or as the basis for later decisions. Commonly, they run into a jungle of contradictory estimates of the productivity of a single work station. They think this variety is the result of confusion or plain cussedness, and they generate a lot of sparks trying to get plant-wide agreement on one figure.

This is a mistake. Using one figure would stifle progress and drive underground (but never eliminate) the essential variety ... because each of the estimates is authentic. Each is true for the particular circumstances under which it was made.

Good again!

Take an example. Let's say the Industrial Engineers estimate the productivity of a work station at 150 units per day. Their governing conditions are the ideal; time study, best method, steady workers, and all--theoretical productivity under completely controlled conditions. Now you go to the Budget and Cost Accounting people and ask the same question. They adjust the I.E.'s estimate a bit, since they know men just don't work at an ideal rate. So their estimate is more moderate--say 120 units. But the foremen and production schedulers know for a fact that the historical data on that work station show that, everything considered, you can expect about 50 units a day. So what does the poor scheduler tell you? Maybe 80, maybe 100, but it will be a compromise between the actual and the standard times. After all, if he only asks for 50, that's all he'll get (or less!), and he has a wife and kids, so he knows he has to adjust to reality, no matter what the productivity should be. So he estimates what each work place might yield, expedites to try to keep the flow of work on schedule, reschedules to compensate for various changes and/or fall-downs, and negotiates for supporting performance from other functions and services. His main preoccupation is "what can this work place (or system) be DEPENDED UPON to produce?" The net performance probably won't agree with any of the productivity estimates, but that doesn't mean the estimates were all wrong, or that they should have been ignored.

It seems difficult for men not involved in manufacturing to appreciate that these variations in estimate are not only held, but are actually used by various functions in the organization. Then when you add in the variations and complications that result as these estimates feed their signals into the system; and as new machines or methods, different product specs, and heaven knows what else come up to affect your original estimates, you can see why the system has to be flexible enough to react to changes and still protect the essential variety of input. It must be sensitive to the constantly changing experiment. Performance variations from any schedule are inevitable. Instead of trying to legislate them out of existance, systems designers should use them. They're signals, after all; they're information you can use.

This is the reason I feel so strongly that the shop control information system must be conceived independently of the static, after-the-fact accounting and capital management system. This is also why all the anxiety about eliminated jobs and not just among engineers, planners, and other functions is nonsense. These jobs may now, outside experts either, for the first time, require high competence and alertness, but they are more essential than ever (1) to feed into the system realistic targets and (2) to cope with adjustments later to keep the show on the road.

Sincerely yours,

W. B. Cummins, Chairman
Industry Department

True, but you can't add wages, metal, grease, and kilowatt-hours. The only common denominator is cost. So the two systems both ultimately use the same language and should be coupled together somewhere -- perhaps finished goods inventory.

excellent point, seldom recognized

Agreed. Keeping score with dollars is just a habit -- a carryover from the days when managers were owners.

NEW or OLD— all plants need methods improvement

Does a new plant need a methods improvement program? It certainly does—just as much as an old plant. Here's a case to prove the point, with ideas good for any plant, including yours.

The Air Conditioning Division of Westinghouse Electric Corporation moved into a new plant in Staunton, Va., in 1954. The facility was specifically designed to make air-conditioning units at a low cost, for future as well as current needs.

Within two years changing conditions had made layout and methods obsolete. Changes in products and additions to the line were largely responsible.

A major modernization project brought the plant back to its original efficiency. It included a building extension and the relocation of some substations. Superintendent of Manufacturing Planning R. E. Buenting says these features made modernization easier: large 40x60 bays; high ceilings; no shop partitions; tilt-up wall with steel sash and corrugated siding. (This wall was removed and reinstalled in the extended part of the building.)

Even that wasn't the end. Other product changes have occurred since, including the addition of electric heating equipment and large condensers. They have forced further changes in layout and methods.

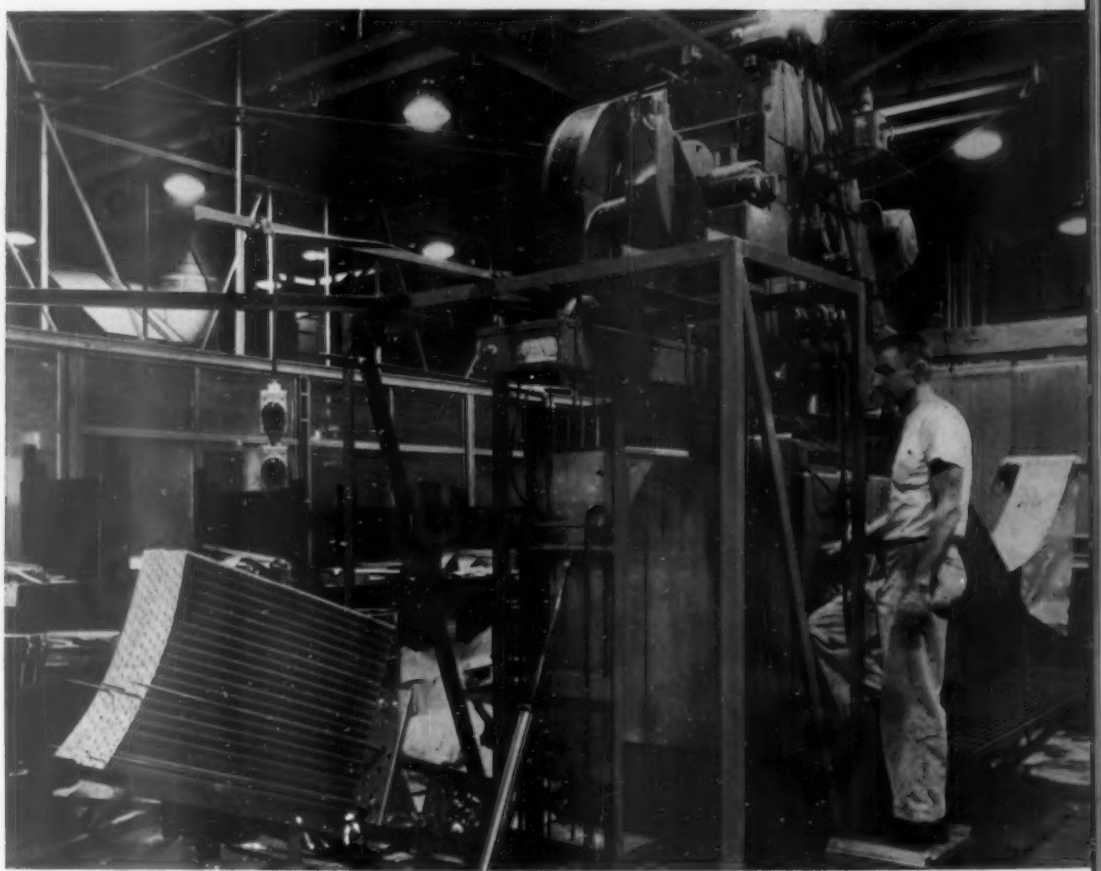
But most important of all, the managers who helped modernize the plant four years ago have continued to use the training it gave them. They have made methods improvement an accepted routine. Manufacturing Manager W. E. Hoctor says: "Constant review of our facilities is necessary to remain competitive." The examples on this and the following pages prove he "isn't just whistling Dixie."

Two torches are better than one

They now cut condenser shells to length and bevel the ends in one operation, at a saving of $670 per year. The end bevels on condenser shells used to be turned in a lathe, one end at a time. And that was after the shells were cut from pipe in a preceding operation. The savings are net, after deducting additional scrap and tooling costs.

New 60-ton punch press lops $12,000 off costs

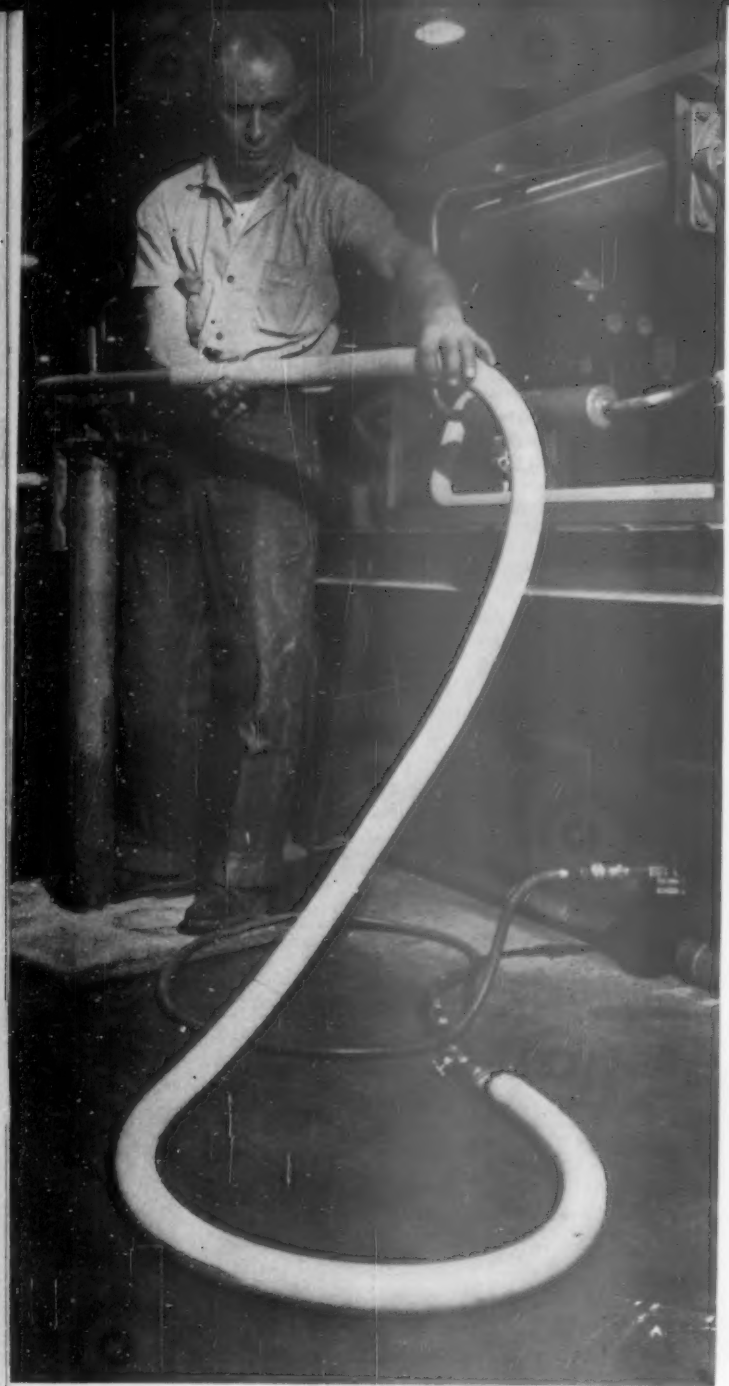
It processes aluminum fins for evaporator and condenser coils. It has replaced three 20-ton presses, each making one fin per stroke. The new press runs faster and produces three to six fins (depending on size) per stroke. Net gain: twice the output capacity in two-thirds the floor space.



Less material—but just as good

Compressor-end housing redesign saves $4500 per year without sacrificing quality: As the picture shows, it cut sizes of screen and reinforcement. New casting pattern, new dies for screens, and assembly rebalancing were routine problems.

Turn the page



Tubing idea worth $1940 annually

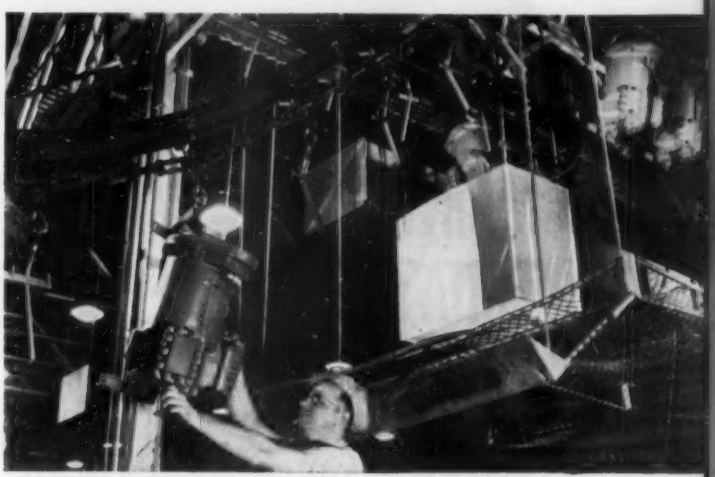
The cold tubing of air-conditioning units was previously insulated (to prevent condensation) by hand-wrapping felt tape around the metal tube. Change to extruded foam-rubber tubing saves $800 in material and $1140 in labor per year.

Racks utilize full height, save space

Important feature of these racks is their steel corner posts. They fit together to make a stack of four racks that's rigid enough to be moved by a fork-lift truck. The racks are safely stacked to the full 18-ft. height from the floor to the trusses. Extension corners are available if larger items are to be carried.

Removable shelves

They cost $30, return $4260 per year. Fitting on the front of press brakes, they permit the operator to move parts between brake and skid by one stack at a time instead of one piece per move.



Automatic dip painting saves $4000 yearly

Also, placing the operation overhead freed 1000 square feet of floor space. The chain conveyor is loaded and unloaded by the operator. As it advances one station, the overhead paint tank is raised by hydraulic cylinders around a compressor, is then lowered on a predetermined cycle. The tank catches most of the drippings. Old method used spray painting. Cost of new set-up: $3500.

Good, better, best—by $2960 per year

That's the evolution of the three packages in photo (left to right). All three passed the safe-transit test, so quality wasn't sacrificed.

MAINTENANCE MANAGEMENT TODAY: TROUBLED, LAZY

As production feels recession's pinch, worried maintenance men are doing little else but wait and hope.

That's the impression FACTORY's editors got from rubbing shoulders with the 1200 plant management men (photo above) who attended the 12th annual Plant Maintenance and Engineering Conference in Chicago this winter. On the surface, there was little talk about a recession. But everywhere there was an undercurrent of worry. Almost nowhere (except on the podium) was there evidence of active leadership on the part of maintenance managers in cutting plant operating costs.

When probed by FACTORY's questions, the almost universal reply was: "Production is down, but top management hasn't put any unusual pressure on us for savings. If we get through June without a cutback, we'll be O.K." Only an occasional maintenance manager would admit openly that the heat had already been turned on. One paper mill engineer told us he had received a flat order to reduce his maintenance bill in January by 25%. Another maintenance specialist from a midwestern chemical plant said, "I know our company is in profit trouble. I don't wait for the word. I try to initiate economies before I'm given what may be unreasonable directives." But most of the conferees were reluctant to see maintenance for what it is likely to be in the spring of 1961—industry's fat cat.

Maintenance, in most organizations, so far this year has been spared the searing blast of an all-out cost-reduction push. There are many reasons for this deferred impact. Top management has become educated to the need of continuing maintenance. Capitalized modernization work for this year has already been committed; so many maintenance gangs are performing the construction work usually contracted outside the organization. And some maintenance groups are still working off their traditionally high backlog. All of these are good reasons for not arbitrarily slashing the plant maintenance effort. But none of them are good reasons for managers of maintenance to stand pat.

Venerable L. C. (Jack) Morrow, editor emeritus of FACTORY and chairman of the conference, cast the challenge for maintenance managers. He said, "You are at a point in your life cycle from which you can jog along on an even course, or take off for a dynamic and progressive journey . . . It is shocking that many estimates in the field of maintenance show we achieve only 40% of worker efficiency. This low figure is largely due to management shortcomings, and it is high time we did something about it."

The conference papers outlined three major areas for much-needed management improvement: (1) cost accumulation and control, (2) organization and methods, and (3) engineering applications.

Need No. 1: Sharper cost control. "If you have never undertaken a planned program of cost reduction, you will be shocked at what is available," was the opinion of Herbert D. Sprenger, plant engineer, American-Standard Industrial Division, Columbus, Ohio. He added, "Where you start depends upon evaluation of your own conditions. But, for heaven's sake, get started. Don't try

to take the whole plant in one step. Set a limited objective in some area where you know you can get factual cost data. Analyze these costs to determine what causes them, then decide if there is anything you can do about them.

In a discussion of accounting for maintenance costs, Daniel H. Moses, maintenance control engineer, Merck Sharp & Dohme, Rahway, N.J., cautioned against too-ambitious cost-collecting systems. He said, "Before adopting a system which would give countless figures and facts, decide what ends this information will serve. You must be convinced that a detailed cost breakdown will be used to investigate and to improve maintenance performance." Mr. Moses suggests that costs be collected by (a) steps of the process and (b) category of equipment. "The first and vital link in the analysis and control of maintenance," he observes, "is the original work-order request." Too many systems falter at the very beginning, he implies, because of inadequate attention paid to this basic and important item.

In measuring how well the maintenance operation is run, T. E. Harris, superintendent of maintenance, Parke, Davis & Company, Detroit, offers an easy yardstick: work accomplished versus work scheduled. "You can improve this ratio," he says, "by guarding against unscheduled assignments, assuring release of equipment from the production department when committed, and by minimizing engineering field changes."

Need No. 2: Tighter organization and methods. "Most of us do not have as clear an understanding of our responsibility as we like to think we have," says Wallace E. Fore, plant engineer in charge of 1200 men at North American Aviation, Inc., Los Angeles. "Most of us are so completely involved in solving the many complex problems presented that we seldom take an objective look at our over-all responsibilities. A detailed description of your functions is the best way to take this objective look."

Speaking for a plant that has achieved a sound measure of maintenance efficiency, John M. Link, chief of plant department, Burlington, N.C., Shops, Western Electric Company, recalls the plant's starting condition; "Our major weakness was that we had arrived at a position of being overstaffed at times, understaffed at other." Establishment of "should-take times" for job standards, supplemented by work sampling studies, aided Link's plant in leveling out schedules.

Planning, which incorporates a work simplification program, was described by Robert W. Snow, mechanical methods program coordinator, Procter & Gamble Company, Cincinnati: "Upon receiving a work request, the maintenance manager-planner visits the job site to determine what must be done and the best method to follow. Each job is questioned for elimination. The basic cause for the job is sought. We ask the question, "If it were not for this basic cause, could this job be eliminated?' We question the purpose of the producing equipment, too, with the hope that we may never be bothered with maintaining it."

Need No. 3: Better engineering techniques. Challenges and opportunities to utilize existing equipment and devise new engineering techniques abound, according to a number of conference speakers.

White rooms, for instance, came in for a lot of attention. Aside from the typical "massive area" control for hundreds of employees, a solution to the need for smaller, partially controlled areas was described by Robert L. Cash, plant engineer, Semiconductor Division of Texas Instruments, Inc., Dallas. This solution involves compromising on objectives—such as limiting *minute* control to only two variables like temperature and cleanliness. But the real problem, he says, is the human one. "Mechanically, a room or space can be made cleaner than you can measure, and it can be maintained in the same way until the human factor is introduced." Speaking on this point, C. E. Schmid, manager, plant engineering and facilities, Kearfott Division, General Precision, Inc., Little Falls, N. J., listed 28 rules for employees. (Copies of these rules can be obtained by writing FACTORY.)

Leonard R. Hostetter, process and production engineer, Buick-Oldsmobile-Pontiac Assembly Division, General Motors Corporation, Linden, N. J., noted the trend toward higher voltages in both primary and secondary phases of recently installed power distribution systems.

In maintaining automatic and static machine controls, O. C. Gochenour, general foreman of maintenance, Aliquippa Works, Jones & Laughlin Steel Company, encouraged the extension of duties for motor inspectors rather than the employment of specialists.

A growing trend toward group retubing of electronic tubes in control instruments was described by Roy E. Snider, superintendent of maintenance and construction, AC Spark Plug Division, General Motors Corporation, Flint, Mich.

Two utility problems continue to plague plant maintenance today, warned speakers on air pollution and water supply. "Despite the hue and cry by many members of the 'push-button' school of air pollution control, the problems are still extremely complex and I think it's vital that there be the widest possible public comprehension of this complexity," said Granville A. Howell, assistant to the vice president of engineering, United States Steel Corporation, Pittsburgh. "Water use is increasing three times faster than population growth. As a result, much of the water used in 1980 will have to be used more than once on a very large scale. The problem will be to maintain or improve the quality of our water while handling the ever-increasing pollution load," said H. W. Poston, regional program director, water supply and pollution control, U. S. Public Health Service.

The road to follow. "One of the bothersome things I have observed in talking to participants is how well satisfied all of us are with the way we are doing things in our own plants. We are getting too smug. There is one best way to do anything—a way flexible in its approach, but firm and solid in its ultimate goal," concludes Matthew A. Simmerman, plant engineer, Merck & Company, Elkton, Va. "There is a best way to pack a pump, to clean a motor, to deal with a union, to treat people—one best way to implement administrative responsibility . . . Or we can go along with the concept of not sticking our neck out too far, not trying to change things too much or too fast . . . I believe the most routine maintenance job has a challenge: to improve it, to make the repair last longer, to change the material of construction, to eliminate the problem, or to do it better."

HOW TO MEET FOREIGN COMPETITION

An editorial commentary

BY THE EDITORS OF THE ROYAL McBEE NEWS,

a publication of Royal McBee Corporation, Hartford, Conn.

This editorial (right) is directed at a group of American working people who have found out about foreign competition the hard way. FACTORY's editors believe it has a message for you. We reprint it here for two reasons. First, it tells the story behind the Royal McBee modernization story which appears on page 90 of this issue. Second, and most important, this editorial is an inspiring example of how management can speak to its employees about vital issues.

FACTORY's editors commend the Royal McBee directors for betting $1-million and five years of grace on the ability of its manufacturing people to get an old plant in a troubled industry back on its feet. We salute the courage of the plant management in proposing the gamble. FACTORY hopes it can prove its point: ". . . that we in Hartford can make the best typewriter and that we can do it at the same cost, or less, than in Holland, Springfield, or at another plant in this country."

Finally, we praise the editors of Royal McBee News for their eloquent statement of the challenge and the opportunity facing the Hartford plant. We feel it epitomizes what foreign competition may eventually mean to every plant in America.

It's your move

The one basic fact cannot be overemphasized. Our jobs in Hartford have been seriously threatend. We have come very close to losing them. It's going to take all of us, working together, to keep them.

A few years ago the office typewriter industry found itself facing extremely serious problems. Modern, progressive plants had sprung up in Italy and Germany and typewriter imports from these nations were flooding our domestic markets. The labor was cheap, the price was right and the quality was good.

Royal McBee and the other major U. S. manufacturers had plants in Europe. They had been built to protect our foreign business as a result of the formation of the European countries who banded together for the tariff-free exchange of trade for member nations. Non-member nations faced a stiff tariff wall.

To hold our domestic business, and meet the challenge of imports, we started selling our Holland-made typewriters in this country.

In the meantime, special teams were set up to study this critical situation. They were to determine if it would be better to move all of our office typewriter manufacturing from Hartford to Holland. Move to, and expand, our new plant in Springfield, Mo. Build a new plant elsewhere in this country. Or can we modernize the Hartford Plants and make a better typewriter at a cheaper cost?

The Company directors made the decision to invest one million dollars in the Hartford Plants in a modernization program.

They gave us the opportunity to hold our jobs in Hartford. They gave us five years to do the job. Five years to prove that we in Hartford can make the best typewriter with our proven skills and that we can do it at the same cost, or less, than in Holland, Springfield, or at another plant in this country.

One mile and a half of conveyor will be installed within the next 15 months. Manufacturing and assembly operations will be rearranged to insure the smooth and efficient flow of parts and assembly operations. New equipment is being purchased.

The most important element of all of these changes is our cooperation. In a move of this kind everything will not always work out as smoothly as planned. Some mistakes will be made and corrected. There is bound to be a certain amount of confusion.

It's our move now. It's up to us, management and employees, to work together for this single purpose—holding our jobs in Hartford.

A

FACTORY

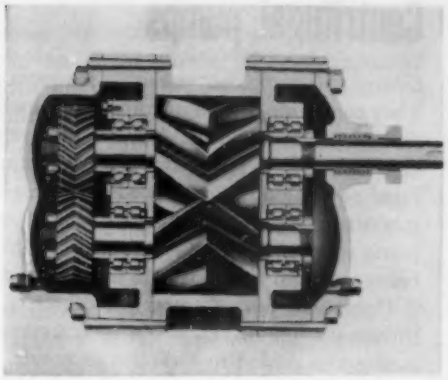
ENGINEERING AND TECHNOLOGY REPORT

PUMPS

NO. 11

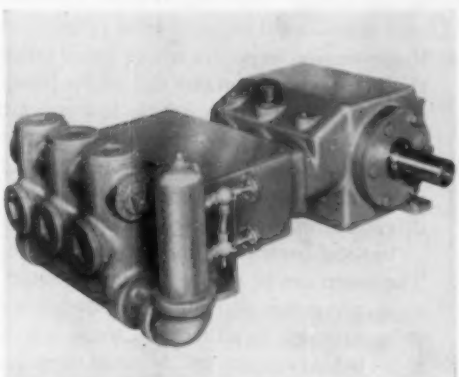
PUMPS
PUMPS
PUMPS

CENTRIFUGAL PUMP is for general water service. Many physical variations make it a versatile type.



ROTARY PUMP traps liquid between unmeshed gear teeth or screws and forces it out as teeth mesh.

SIMPLEX STEAM PUMP has single steam and water cylinders. Stroke-operated pilot drives steam valve.



POWER PUMP can have single or multiple cylinders. Electric motor, V-belt, and chain drives are common.

Pump-type selection guide

CHARACTERISTICS	CENTRIFUGAL		ROTARY	RECIPROCATING	
	Volute and diffuser	Axial flow	Screw, gear, and sliding vane	Direct-acting steam	Power
Liquids handled	Clean, clear; dirty, abrasive liquids with high solids content		Viscous, non-abrasive	Clean and clear	
Discharge flow	Steady	Steady	Slightly pulsating	Pulsating	
Usual maximum suction lift (ft.)	15	15	22	22	
Discharge pressure range	Low to high		Medium	Low to highest produced	
Capacity range	Small to largest available		Small to medium	Relatively small	
How increased head affects:					
Capacity	Decrease		None	Decrease	None
Power input	Depends on pump type and specific speed		Increase	Increase	Increase
How decreased head affects:					
Capacity	Increase		None	Small increase	None
Power input	Depends on pump type and specific speed		Decrease	Decrease	Decrease

Turn the page

Centrifugal pumps

Centrifugal pumps are probably the most prevalent type of pump used in industry today. They can pump almost any liquid or any liquid-solid mixture that will flow through a piping system. And they are easy to control—by varying speed or by throttling the discharge. Since motor drivers predominate, most centrifugal pumps are nominally rated at full-load motor speeds. But for other driver types—gasoline engines and steam turbines, for example—pump speeds can be varied to suit. Where the necessary pump speed and driver speed don't match, speed-changing gears or belts can be used between pump and driver in an infinite number of combinations.

Operation: Liquid enters the center of a whirling impeller and centrifugal force throws the liquid outward in all directions. Liquid is then collected in an annular casing and guided to a discharge nozzle.

Basic types: The double-suction, horizontal type shown on page 81 is used for many so-called general services, such as boosting plant service-water pressure. When needed pressure exceeds the limit of a single impeller or stage, several may be used in series in one casing. Then liquid flows through each impeller in turn—pressure being added each time—until required total pressure is reached. Other horizontal designs have single-suction impellers where liquid enters impeller from one side only. Here both shaft bearings are on one side of the pump and the impeller is "overhung." This type is most common for relatively low capacities. And since only one stuffing box need be looked after here, single-suction pumps are very popular in the chemical and refinery services. Another popular variation in industry calls for a pumping element mounted right on the driving motor shaft—no separate pump bearings to lubricate, no pump-driver alignment to worry about.

Vertical centrifugal pumps offer space advantage in many industrial applications. The pump can be submerged in the liquid pumped with the motor high and dry. In some cases, the pump element is mounted in a dry pit adjacent to the pit holding the liquid to be pumped. In either case, there is no need to prime the pump separately—just vent to fill before starting up. Vertical centrifugal pumps can be single or multi-stage, depending on pressure needed. A special case: Vertical turbine pumps are usually made in sizes to fit into standard well casings. Larger vertical pumps can handle extremely high capacities—flood control and condenser circulating water systems.

Special designs: Where fluid-solid mixtures are abrasive, special designs using very hard materials are available. Ore handling is an example. When solid sizes increase, special pumps are built with very large internal passages to avoid clogging. Sewage pumps are an important application here.

Self-priming pumps are often used in portable applications so they don't have to be primed every time they are started up. Here liquid is recirculated internally, washing air out of the suction line. When the pump is full, it starts to deliver.

Canned-motor pumps are a recent extension of pumps and motors built on the same shaft. Motor and pump are built in the same casing—no stuffing box. Motor windings

DEFINITIONS OF HYDRAULIC TERMS

Static suction lift: Vertical distance in feet from supply level to pump centerline for a pump above supply.

Static suction head: Same as static suction lift, except that the pump is below supply level.

Static discharge head: Vertical distance in feet from pump centerline to point of free delivery.

Total static head: Vertical distance from suction level to discharge level.

Friction head: Pressure in feet of liquid needed to overcome pipe and fitting resistance.

Velocity head: Energy needed to give desired flow, equal to velocity squared divided by 64.4 ($V^2/2g$).

Suction lift: Static suction lift plus friction head and velocity head.

Suction head: Static suction head minus friction head and velocity head.

Discharge head: Static discharge head plus friction head and velocity head.

Total head: Sum of suction lift and discharge head. Where there is a suction head, total head is the difference between discharge and suction heads.

Net positive suction head (npsh): Absolute suction static head, plus suction supply pressure, less friction losses and vapor pressure of liquid pumped.

Note: Some engineers use **dynamic** suction lift, **dynamic** suction head and total **dynamic** head instead of the terms above. While the term **dynamic** helps express the idea of motion (head when liquid is flowing), the simpler terms above are favored.

are sealed in a can and pumped liquid circulates through the entire pump and motor. Liquid serves both as a lubricant for special motor bearings and as a cooling-medium.

Centrifugal pump impellers can be designed for an infinite number of head, capacity, and speed combinations. Each combination, however, has a dimensionless characteristic number known as its specific speed. Low specific-speed types have low capacities, relatively high heads, and horsepower needs that increase with increased flow. At the other end of the scale, high specific-speed pumps have large capacities, low heads, and horsepower needs that decrease with increased flow. The combinations in between are infinite. Usually, boiler-feed pumps are at the low end of the scale; general-service and process pumps, together with sewage types, in the middle; condenser-circulating and flood-control types at the high end. You should rate drivers for low specific-speed pumps to cover pump power requirements at rated flow, including emergency peaks. But where specific speeds are high, you have to be careful to cover zero-flow horsepower needs. For extremely high specific needs, this may not be practical. Zero-flow horsepowers may be several times rated horsepower—this would make motor costs prohibitive. So you have to avoid the possibility of zero-flow operation right in the system design.

Rotary pumps

Specially designed to pump liquids that have high lubricating qualities, rotary pumps are widely used to transfer fuel and lubricating oils. They are positive displacement pumps; do not have to be primed. But the system should be full of liquid before rotary pumps are started—air is a poor lubricant.

Operation: Liquid to be pumped is trapped between peripheral teeth of rotary-gear and screw types (between extended vanes in the case of sliding-vane types) and then forced out at the point of gear or screw mesh.

Basic types: Rotary-gear pumps (photo, page 81) may or may not have timing gears. Although timing gears add to pump cost, they allow the designer to eliminate power transmission from his pumping gears. This permits better hydraulic characteristics. Screw pumps substitute meshing screws for gears. Where pressures to be developed are high and for high-viscosity fluids, screw pumps have better operating efficiency. They give more nearly pulseless flow. Again, they may or may not have timing gears. For light-duty, rotary pumps can be built without separate bearings. But separate bearings are best for any rotary pump—especially where reliability is a factor. Internal gear pumps merely have one internal gear driven by a smaller, off-center, external gear. The partial void between the two gears is filled by a stationary crescent.

Special designs: Sliding-vane rotary pumps have only one rotating element. Vanes both extend and retract as they run in an eccentric casing, alternately taking in and expelling pumped fluid. For extremely high viscosities, rotary pumps are often steam-jacketed to ease start-up and minimize horsepower demand when running.

Very close internal running clearances must be maintained in a rotary pump or efficiency will fall off rapidly. Since most designs call for bearing lubrication by the liquid pumped, abrasive liquids should never be handled by rotary types.

Reciprocating pumps

Two basic subtypes of reciprocating pumps serve many industry needs (photos, page 81). Both are based on the same pumping principle—only drive arrangements differ. They are positive-displacement types and output pulsates so that a surge chamber is usually put on the discharge line. Multiple pumping cylinders cut pulsating by overlapping strokes.

Steam pumps find widest use as boiler feeders in small power and heating boilers. Power pumps, because of their extremely high pressures developed at relatively low flows, often serve hydraulic presses.

Operation: Both types use one or more pistons or plungers, which may be single or double acting (pump on one or both sides) and travel back and forth in a close-fitting

cylinder. A system of valves permits entry of fluid on the suction stroke and forced discharge into the system on the return stroke. Steam pumps are driven by a special type of steam engine. In single-cylinder (simplex) types, steam valves are pilot-operated, but in two-cylinder (duplex) pumps, steam valves of one cylinder are operated directly by the connecting rod of the other cylinder. Power pump pistons are driven by connecting rods to a crankshaft. Drive may be direct or through belts or chains.

With positive-displacement pumps, flow control is possible only by varying speed or stroke length. Thus, in many reciprocating pump applications, accumulators serve the system continuously; pump operation is intermittent to keep the accumulator full.

Standards of the Hydraulic Institute cover all pump types—centrifugal, rotary, and reciprocating—with sections on nomenclature, hydraulic calculations, test methods, installation, and operating data for each classification. Copies may be purchased from the Hydraulic Institute, 122 East 42nd St., New York 17, at $6 each ($6.50 foreign).

Base your selection on service conditions

Although most pump manufacturers will help you define operating conditions, the responsibility for their accuracy rests with you, the buyer. So it's essential that you be able to check the accuracy of flows and heads calculated.

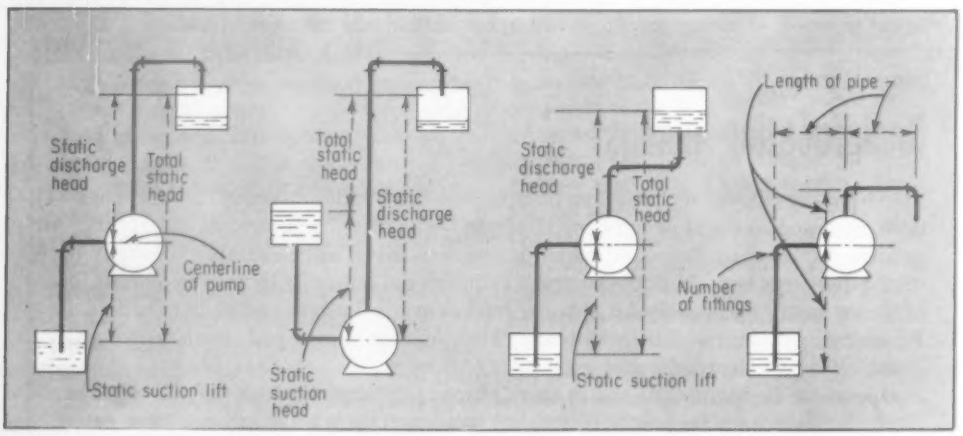
Make a layout sketch of your system as the first step. Most industrial jobs fall into one of the layouts below, but always make a sketch of your own. If your system is complex, an isometric sketch will usually make it clearer.

Determine capacity you need to do the job. This will rarely be a fixed value—more usually a range that varies from a minimum plant load to a maximum emergency condition. But pumps are rated and guaranteed at one flow only by the manufacturer, so you will have to select a rated capacity which reflects the most usual flow.

Figure the total head—probably the hardest part of the job. First, study the definitions on page 82, then go to your system layout and figure static suction head (or lift) and static discharge head. Next, go to any good hydraulic table and get total friction losses for your system. Most tables give you an equivalent pipe length for fittings and valves. This should be added to the actual length of system pipe to give an equivalent pipe length. Friction losses are then based on this figure.

Once you know your pipe size you can figure fpm. velocity. Then you can figure velocity head from the formula in the definitions. Total head at rated flow will be the summation of suction head and discharge head, with due regard to whether suction is actually a head or a lift in your system. Since you will initially have to make an educated guess at pipe sizes, you will probably have to refine your figures after a trial or two. You will then have the most economical pipe size for your system.

Typical piping hook-ups



Solve most common pump troubles yourself

The vast majority of pump troubles fall into two general categories. (This presumes a correct original application and installation, plus a successful period of operation with proper maintenance.) So here's what to do when trouble comes:

Hydraulic troubles. Check the suction side of the pump first. Many things can affect suction-side operation—such as clogged impellers, air leaks in the suction line, and changes in the suction system.

Mechanical troubles. Check pump-driver alignment first. Effects of misalignment can be far-reaching, and they can at first glance appear to be unrelated. Example: premature bearing failure can result from excessive loads produced by misalignment. In the extreme, internal contact can occur.

The checklist below lists most common pump troubles and items to check in each case.

CENTRIFUGAL

Pump does not deliver sufficient capacity
- Pump not primed
- Suction line not completely filled
- Insufficient margin between suction and vapor pressure
- Suction lift too high
- Air pockets in suction line
- Inlet of suction pipe insufficiently submerged
- Speed too low
- Wrong direction of rotation
- Internal damage or excessive wear

Pump does not develop sufficient pressure
- Excessive air or gas in liquid
- Speed too low
- Total head of system higher than design of pump
- Liquid viscosity differs from pump design
- Parallel operation of pump unsuitable for such conditions
- Internal damage or excessive wear

Pump requires excessive power
- Speed too high
- Wrong direction of rotation
- Total head of system higher or lower than pump design
- Misalignment
- Specific gravity or viscosity of liquid differing from that for which pump was designed
- Packing incorrectly installed or held too tight
- Internal rubbing
- Impeller clogged

Pump vibrates or is noisy
- Pump suction not completely filled with liquid
- Suction lift too high
- Operating at low capacity
- Misalignment
- Shaft bent
- Foundation not rigid
- Rotor out of balance
- Lack of lubricant in bearings
- Excessive lubricant in bearings
- Internal damage or excessive wear
- Rusty bearings
- Dirt in bearings
- Condensation in bearing housing caused by excessive cooling water.
- Internal rubbing

ROTARY

Pump does not deliver sufficient capacity
- Suction lift too high
- Suction pipe too small
- Bypass or return line partially open
- Relief valve improperly seated
- Air leaks in suction line
- Excessive internal wear
- Speed too low
- Wrong direction of rotation

Pump requires excessive power
- Speed too high
- Viscosity or specific gravity too high
- Obstruction in suction line
- Stuffing-box packing too tight
- Shaft bent
- Misalignment

Pump is noisy
- Insufficient liquid supply
- Air leaks in suction
- Misalignment
- High spots on rotating element
- Bent drive shaft
- Excessive pressure
- Coupling out of balance

RECIPROCATING

Pump fails to deliver sufficient capacity
- Suction lift too high
- Suction valves stuck or worn
- Air leaks in suction line
- Piston packing badly worn
- High back pressure

Pump takes too much power (power pumps)
- Packing too tight
- Discharge pressure too high
- Viscosity of liquid causes excessive losses

Pump speed is too fast (steam pumps)
- Worn piston packing
- Blocked or leaky valves

Short stroking (steam pumps)
- Excessive cushion in steam cylinders
- Piston rings striking worn shoulders in cylinder bore
- Valves set wrong
- Not enough lost motion

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WORK SAMPLING . . .

. . . is a method of getting facts that avoids the time-consuming job of constant surveillance.

Its heart is random observation (the opposite would be regular observation—say at 45-minute intervals). The observer records information he's interested in at the instant of each visit. By plotting this information on a chart, he can come up with a cumulative average that is a highly accurate gauge of product quality, machine operation, or human activity.

MEASURING THE IMMEASURABLE

S&C Electric Company (Chicago) manufactures metalclad switchgear. Its problem: How to establish a standards and incentive program based on varying operations.

Most of S&C's fabrication of metalclad switchgear must meet individual customer specifications. Some enclosures require two doors; others, one or three. Some customers like 600-amp. switches; others, 1200-amp. switches. Fuses, operating lights, door handles are in different spots. Each enclosure has a screen, roof, panel, or door of varying design. And each customer wants a different over-all size.

How could work measurement be applied to such variable operations?

S&C's chief industrial engineer, Al Mandele, was stymied in the fall of 1958. Conventional time studies of each operation would require a year of detailed analysis. Work methods on every task would have to be recorded. Because work standards did not exist, methods and diligence of employees were not defined. It looked impossible.

But there was one common factor: The average number of components per switchgear box varied little from month to month. Despite the random mix of orders through the shop, the over-all average of components was fairly constant.

This suggested a sampling technique, which was confirmed by S&C's consultant, Dr. Marvin E. Mundel: Measure the components, not the people.

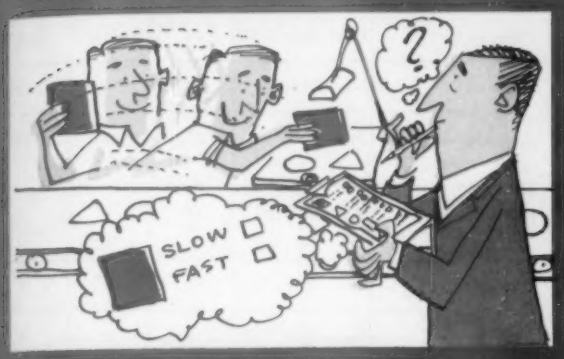
Mandele and Mundel then set up a work sampling technique that required only five weeks of observation. Normal time would have been 12 months.

By November of 1958 the first incentive program had been installed in the shipping department. Results were encouraging enough to continue the program into other departments (see table on page 88).

The impact of the program has hit everyone. Take-home pay has increased for the men, and production has increased for the company.

In the metalclad department, direct-labor costs dropped 38%, while output rose 42%. In shipping, direct labor costs dropped 46%. Yet, as the performance charts show, line men are averaging well over previous take-home pay (100% performance).

EASURING NON-REPETITIVE WORK...

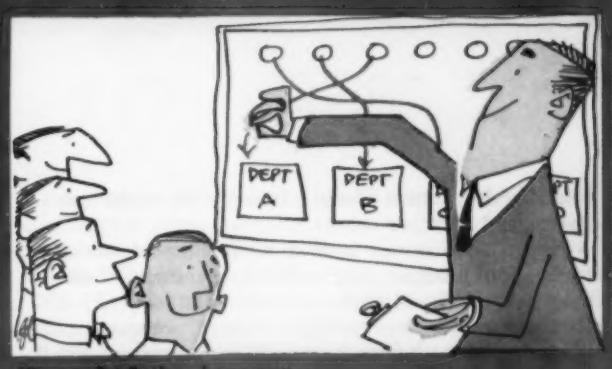


Judges workers' efficiency at same time

Figures standards over four-week periods

K INEXPENSIVE INCENTIVE PLAN WHICH...

Gives greater production



Allows redistribution of manpower

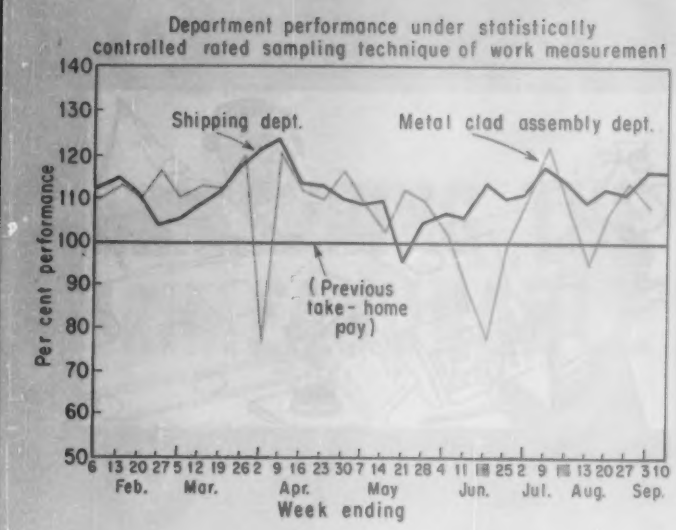
This unique approach to work measurement and group incentive was tailored to S&C's peculiar problems. For 18 years the company had enjoyed a planned policy of full employment. Layoffs were unknown. Prior to 1951, the only standards in the shops were the basic money rates that had been established 18 years previously. These rates covered machine-shop personnel alone. In 1951 S&C installed a standard-hour incentive plan covering conventional machine and assembly operations. However, the metalclad switchgear department presented new and special problems, which required an entirely different approach.

Realizing that these special problems existed, Mandele presented his suggestions to S&C—in the form of a three-step approach:

Step One: Make a four-week work sampling study of operations. (FACTORY, Sept. '59 and July '52)

The key: Measure all the components being processed, not the men. In the final assembly department, these were the procedures:

• Prepare a complete list of cabinet components as assembled in this department. The complete list must contain everything that might cause work in the final


Department performance under statistically controlled rated sampling technique of work measurement
Per cent performance
140
130
120
110
100
90
80
70
60
50
Shipping dept.
Metal clad assembly dept.
(Previous take-home pay)
6 13 20 27 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 2 9 16 23 30 6 13 20 27 3 10
Feb. Mar. Apr. May Jun. Jul. Aug. Sep.
Week ending

Timetable for installing rated incentives

Department	Date of installation	No. of employees Before	No. of employees After	Reduced direct labor
Shipping	November 1958	15	8	46.5%
Assembly	March 1959	21	16	23.8%
Switchgear fabrication	June 1959	28	21	25.0%
"Job shop" (special machining)	February 1961	14	?	?
Receiving	May 1961	12	?	?
Maintenance	September 1961	16	?	?
			Over-all total (to date)	38%
			Capacity increase	42%

assembly department (doors, chain guards, name plates, angles, and 59 other items).

• Assign an observer to both shifts for five weeks—one week of practice, four weeks of meaningful observation. At frequent but random intervals (13,300 observations in one month's survey), observe each worker. Note whether he is idle or working; and if working, on what component. Each round of daily observations should include every man on the floor.

• Just prior to starting the five-week period, take an inventory of all components installed in the cabinets, plus those in the assembly department.

• Count the drawings of all enclosures put through final assembly during the five-week period, as well as all components on them. Subtracting the number of components in the shop (before the audit) from the total drawings gives the number of components studied.

• At the end of the five-week period, another inventory of the assembly department gave the final figure of components worked on.

Analyzing the five figures compiled through these procedures supplied two critical bits of information: (1) An accurate count of completed work, in terms of each component. (2) The per cent of total time spent with each component in the final assembly.

Mandele did not stop here. These analyses yielded historical data only on what the men had done. To establish "what they should have done" was next.

Step Two: At each observation, rate the worker.

During each observation, the observer recorded, along with other information, his evaluation of the speed or diligence with which the worker assembled the recorded unit. This created a series of values (R), the average of which represented the "mix" quality of performance. (See box on facing page).

These values helped to establish "standard man-hours of work per unit of output" for each component. Validity of the values was constantly checked by daily control charts which plotted three things: (1) per cent of time spent with each component, each day, (2) cumulative per cent of time spent, and (3) the control (or chance) limits to indicate when to seek assignable causes for deviations. These control charts were kept until an accuracy of three standard deviations (99.77) was maintained.

The five-week study of the assembly area was terminated when additional observations would have changed results no more than 5%. The only exceptions would have been a great change in work methods or in the typical mix of type installation.

The final list of "standard hours" for each component then became the basis for evaluating departmental performance. But it was recognized as a mean value only for a *mix* of installations, men, and methods. The "standard hours" could not be used to measure one installation or one man's work.

Formula for three-step program

Work sampling

$$\text{Maximum possible chance error} = 3\sqrt{\frac{P\,(1-P)}{N}}$$

P = Per cent of time at any one type of activity

N = Total number of observations

(Control charts are kept until errors are reduced to ± 5%)

Standard man-hours

$$\text{Man-hours for each component} = \frac{\frac{n}{N} \times H \times R \times (1+P)}{W}$$

n = Number of observations for this component

N = Total number of observations made (for all switchgear components)

W = Work-units accomplished during period of observing this component

R = Average performance (arithmetic average of ratings assigned the "n" observations, expressed as decimal)

P = Per cent personal time allowed by company policy

H = Total man-hours worked by all men in departments during the study

Incentive payment

$$\text{Man's earnings} = HR\left(1 + .034 + \frac{S-A}{S}\right)$$

R = Employee's basic hourly rate

H = Hours worked by employee during week

S = Standard hours of work performed by group during previous four weeks (work-units × standard-hour values for all components completed in four previous weeks)

Al = Actual man-hours worked by all men in department (four-week moving total)

.034 = a constant so when groups perform at 120%, earnings are 120% of base pay (used to put this system in line with other incentives at S&C)

For S&C this restriction was not a drawback. Work in the final assembly department was group work in the fullest sense. For effective performance, the work must be taken as it comes; there is no advantage in one group picking choice installations that are easier than the average. The creation of this list of standard hours suggested the final step.

Step Three: Establish an incentive plan based on the previous four-week average.

This was the alternative to blindly establishing an incentive system based on the mean values of standard hours developed by work sampling. Al Mandele realized his data offered shortcomings from the normal incentive approach:

- Manual methods used during creation of the data were not recorded—any improvements introduced by an operator affect performance but may not represent greater effort.
- It is more difficult to correct standards when method changes cannot be detached.
- Short periods of difficult or easy batches in assembly would unrealistically affect pay.
- Because the method of recording work units is based on the day of completion, not on daily effort, short periods must be minimized.

In spite of these apparent drawbacks, S&C was able to develop an incentive plan that has paid off for everyone. Although earnings are now computed by a complicated formula (box above), the employee at minimum receives his previous daily rate.

From week to week (wages are paid weekly) pay does vary. But using a "standard hours" performed by the group for the previous four-week period minimizes such fluctuations. (Recomputing the moving total each week—that week plus the three previous weeks—is a modification of the Rowan Plan of wage payments.)

As protection against unwarranted wage payments caused by an easy mix of installations, considerable changes in work methods, or the work-count procedure, the incentive formula follows a curve rather than a straight line. Up to 120% performance, wages average higher than they would for a "1 to 1" plan. But above 120% employees and company share the increased production. The 120% figure also fits it into other incentive applications at S&C.

As the timetable above (facing page) shows, the work measurement and incentive program has already more than paid for its installation. For only half the cost of the usual measurement program, S&C has achieved a 38% reduction to date in its direct labor costs, plus a 42% increase in production.

The program's results have other untapped benefits. Al Mandele feels the same standard times can also be the basis for more accurate sales estimating and improved production scheduling.

THE ENEMY—a tired, high-cost plant, crowded and inefficient.

THE GENERAL STAFF—shrewd tacti

A few years ago, the office typewriter industry found itself facing extremely serious problems. Modern, progressive plants had sprung up in Italy and Germany and their typewriters were flooding our domestic markets. Their labor was cheap, prices were right, and quality was good.

Special teams were set up to study this critical situation. They were to decide on one of four alternatives: (1) move all our office typewriter manufacturing from Hartford to Holland; (2) move to, and expand our new plant in Springfield, Mo.; (3) build a new plant elsewhere in this country; or, (4) modernize the Hartford plants. Our studies showed that moving to Europe would involve a five-year payout, even if costs there remained static, which was unlikely. Moving elsewhere in this country would also take years to pay off.

But—surprisingly—we found that if we overhauled the Hartford facilities, we could get a payoff in the second year. I say surprisingly, because at a quick glance, the situation looked pretty grim. Our Hartford operation is spread out through a number of old buildings—the last one built 25 years ago. Material handling in these multi-storied buildings was very costly, and most of it was obsolete. We had had 20 years of expansion, during which new operations were fitted in wherever space was available. As a result, work flow and plant layout were badly disorganized. Parts were repeatedly sent from one place clear across the plant for the next operation, then returned almost to the first location for further work. Often, this game of musical chairs involved inter-floor transfers via inadequate elevators. Raw material was scattered all over the plant, and so was maintenance. Not even shipping was centralized. Lighting was pretty bleak in places, and large central aisles chopped up the work areas. We were overcrowded in some departments and were wasting a lot of space and equipment in others.

But we found that not only could we streamline this plant; we could do it without losing any production to speak of. Our strategy was theoretically to erase everything, and start over. We asked ourselves "If we were moving into an old but naked plant—a shell—what would we do? What flow would we set up? How would we handle materials?" The men working on this project did a splendid job of setting up our Springfield plant (a FACTORY Top Ten winner in 1960) and they had

STRATEGIC PLANNING—coordinated attacks on plant manufacturing costs.

BRIEFING SESSIONS—for the combat teams. These men had won their stripes at Springfield; knew how to get men and equipment where and when needed.

tacticians.

COVER STORY

Veteran plant made combat ready

Faced with an invasion of imports, Royal McBee mobilized a corps of experienced planners to turn the tide of battle. The strategy: an all-out blitzkrieg on costs.

By F. F. BEHM, Facilities Planning Manager, Royal McBee Corporation, Hartford, Conn.

learned a lot in the process. I think they're doing an even better job at Hartford.

The first step was to plan the over-all flow, then develop the detailed layout. Some areas couldn't be changed, so had to be planned around. These included the offices, the plating shop, our automatic painting installation, and so forth. But about 90% of our equipment and facilities had to be moved. Almost every operation, every employee was affected. To gain employee support, we went all out to explain what we were doing—and why. (See page 78—ED.)

As soon as top management gave us a green light, the three men in our Facilities Planning Group—Dick Buchholz, Jerry Friedman, and Bernie Rothschild—rolled up their sleeves. Every last one of over 4000 parts was carefully studied for flow, costs, and operations, and a process card made up for each part. By repeatedly playing solitaire with these cards, the group derived a flow pattern so that 95% of the parts go in one direction. Some deviations were necessary to avoid duplicating certain machinery, but only about 2% of all the parts ever have to backtrack.

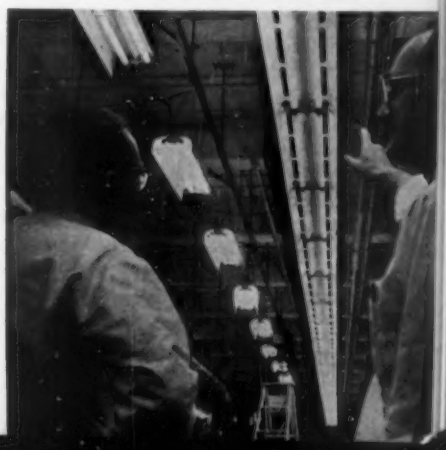
With the flow decided upon, the group made up a detailed scale layout of every machine and feature in the plant. All utilities needed, the exact location of all hardware, all labor and materials needed, and the sequence of each move were planned for. The group even made out the work schedules, job orders, and cost sheets for every step involved.

Since the over-all work flow and layout of the whole plant had been planned, we knew in advance where everything was going. So we didn't have to move in any particular sequence. The move schedule was based entirely on physical ability to move. The earlier transfer of the portable typewriter operation to Springfield made the first hole. After that, it was like a giant game of checkers. We moved out of a space, filled it behind us, then filled the space we'd just made, and so on. All the way along, of course, we had to consider the availability of manpower. We couldn't have all our electricians busy while all the millwrights were idle. Except for building modifications, everything was done by our own people.

Between the time one operation was moved out of an area and another moved in, a lot of preparation was necessary. Often this was only a matter of relighting and painting, and shuffling around a few utility outlets (we put in a lot of bus ducts). But we made a few building modifications. We gained a good deal of space by

FIELD TACTICS—solved problems on the spot. Minor snags were often turned to advantage by swift, effective decisions. All objectives were achieved on schedule.

CLOSE SUPPORT UNITS—went into action along with the main forces.



MECHANIZED UNITS—took care of the logistics problems. From this central control point, supplies are rushed wherever needed. The mechanized forces had a tremendous impact, but getting them into action was our costliest objective.

knocking out some walls, for instance, and by moving aisles from the center to the sides of the buildings. Since we eliminated 90% of our trucking, the new aisles are primarily walkways.

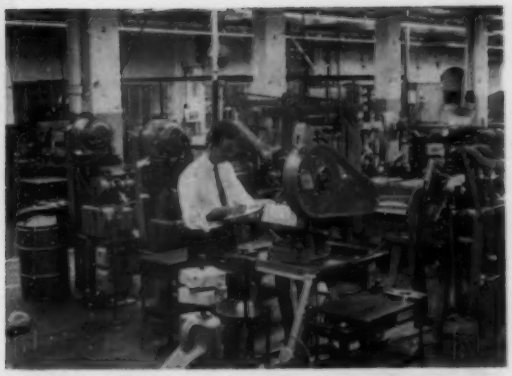
Another brick and mortar change was the new structure that we tucked into an H-shaped area between old buildings. This way, about all we needed was a roof and a front wall. This new building will house all our raw materials. Besides centralizing the function, we slashed manual handling of bar stock by putting in an overhead crane. Now, instead of pulling out a bar at a time and stacking them on a cart, our material handlers can grab a whole bundle at once. We've also hung a few jib cranes in the new raw materials building.

Material handling costs were cut in a number of ways. For one thing, department relocation, relayout, and the combination of related functions have reduced the need for it. This project saved us a lot of space, too, and we've filled it by bringing in several functions that used to be located in various rented buildings scattered around Hartford. So we no longer have to truck so many parts and supplies back and forth. We also put wheels on some of our stock and work tables, so that tables and all can be moved around. Previously, workers had to load and unload these tables by hand and haul the stuff around on skids.

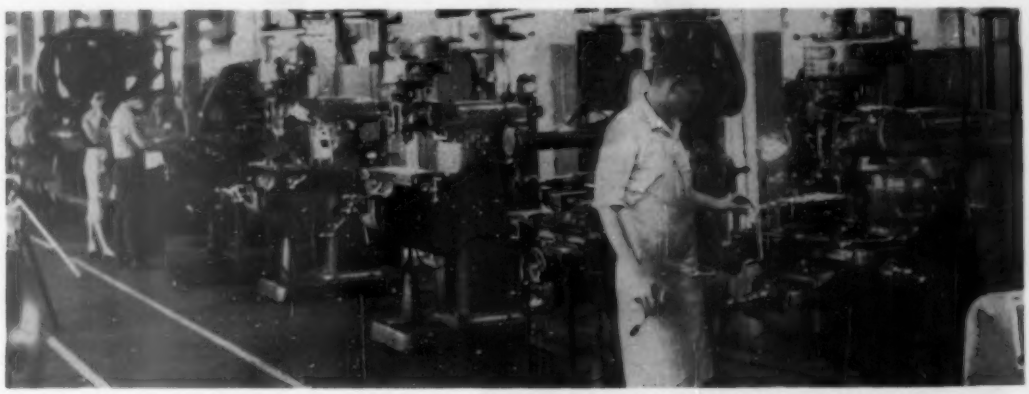
A plant-wide automatic conveyor system, though, is our real pride and joy—the heart of the whole modernization project. This system, similar to the one at Springfield, has 102 motors, over 100 electric eyes, and is well over a mile long. Our centralized stock room is the main control point for the entire system. It also gives us a good production and inventory control point, and eliminates a lot of paperwork. Our conveyor system uses pin-type tote boxes, and any box without a pin automatically goes to the central dispatch point in the stockroom. By sticking a pin in the right hole at both ends of a tote box, we can send a box from any point in the plant to any other point—automatically.

Every department has a central conveyor-and-weighing station. Accumulation lines are built in all over the plant, so neither sending nor receiving stations need constant attention. Actually, we have two complete systems, "connected" (manually) at the central stock crib. All boxes in the manufacturing loop carrying finished parts must go to the central crib, from which they're dispatched to whatever department needs those parts. Even the empty boxes show up for reassignment.

COMMAND POST—sound decisions amid the fury. Immovably entrenched areas were outflanked.



THE SPOILS OF WAR—"liberated" equipment that was taken out of action. At least some of it may be sold.



VICTORY—brings personnel back to their former stations. Morale was high in spite of the sacrifices, because everyone knew the job had to be done. And each worker knew he had a personal stake in the outcome.

In the assembly loop, the boxes are shuttled around between departments. Empty boxes from the assembly loop automatically go through a washing station and then are redistributed. Vertical lifts are integrated into this conveyor system, so we no longer have our elevators tied up with material handling.

Installation of this system has freed a lot of our old overhead conveyor. Our maintenance men rehung it to serve areas not on the tote-box loops. For instance, part of the old overhead trolley now feeds finished typewriters to the shipping department.

All our savings aren't being wrung out of material handling, of course. A healthy chunk represents saved space. We got two clean, hollow buildings through better layout alone! In fact, we got more space than we anticipated, so we're bringing in sections of our engineering and development, for which we hadn't originally expected to have room. Furthermore, we're allowing for expansion.

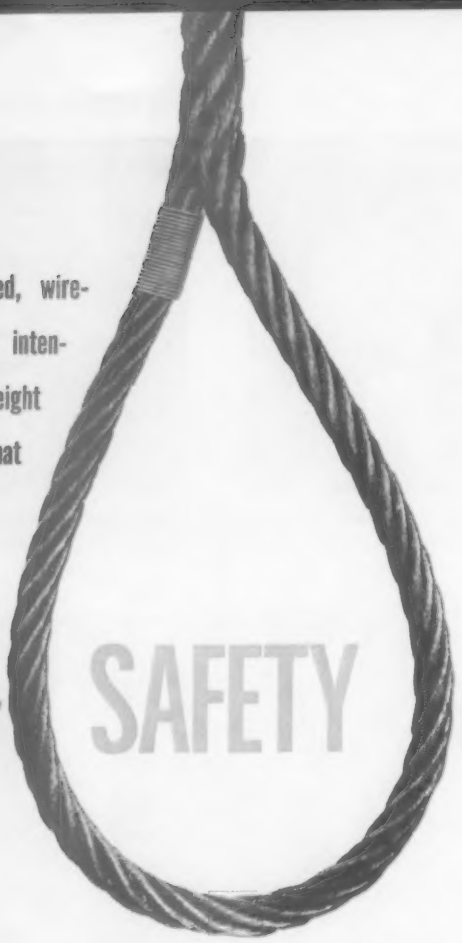
Some of the space was sort of handed to us by a new corporate distribution system, which cut out in-plant warehousing. And some of this was a little surprising: Methods work over the years—eliminating a worker here and there—had given us a good deal of space we hadn't been able to use before. It was splintered, "unusable," buried. But now we can recognize the benefit, and it really adds up.

Most of the space, though, was saved by relocating aisles, consolidating related functions, combining and reshuffling operations, and through better layout. Both electric and manual typewriters are now assembled on the same floor, and feed a common shipping department. Maintenance has been centralized near manufacturing. Because of floor-bearing capacities, raw materials problems, and so on, we've set up our flow to start at the bottom and work up, with assembly and shipping on the fourth floor.

Power, heat, and steam didn't have to be changed much, but we put in new bus ducts and have replaced the old lighting with strip fluorescents. The bright new lighting is helped a lot by a complete paint job, in restful pastels. We also plan to give the plant exterior a face-lifting, but that can wait.

For now, we've invested about a million dollars and overhauled the entire operation, with very little lost production. We're almost finished—six months ahead of schedule—and we're sure, now, that savings will pay for the whole project in less than two years.

Too often taken for granted, wire-rope slings have undergone intensive testing during the last eight years. Result is new data that will help you . . .



PUT SAFETY INTO SLINGS

WIRE-ROPE SLINGS have always offered many advantages for any hoisting job: good flexibility, high strength per unit weight, ample resistance to shock loads, plus the advantage of ready inspection.

But because hand splicing has been more of an art than a science, safe loading has been a difficult decision. Recent improvements in wire-rope manufacturing have further confused the picture. Adoption of improved plow steel for the wire, plus new methods of drawing the wire and winding the rope, have created lighter slings capable of lifting larger and heavier loads.

But just how safe are the newer wire-rope slings? The Wire Rope Technical Board now recommends the loading values given in the table at top of opposite page. The result of more than 288 tests by 12 different companies, the new loading values depend on four factors: splicing efficiency, number of rope parts in the sling, type of hitch, and radius of curvature around which the rope is bent.

Splicing efficiency is defined as the ratio of strength of a splice to strength of wire rope. It is always less than 100% on a new sling and gradually decreases owing to loss in strength from use.

In the past, splicing efficiencies varied from 70 to 95% depending upon rope diameter, quality of workmanship, and type of splice.

The committee adopted the thimble or loop splice as the standard, and developed the following values of nominal efficiencies for hand-spliced slings:

Rope diameter (in.)	Nominal splice efficiency
1/4	.90
5/16	.89
3/8	.88
7/16	.87
1/2	.86
9/16	.85
5/8	.84
3/4	.82
7/8 & larger	.80

The nominal value selected is representative of 80% of all actual tests and assumes the splice has been made in a workmanlike manner (see picture panel, facing page) with new undamaged rope. Minimum sling breaking strength is established as 0.925 x nominal efficiency values.

However, serviceability of a wire-rope sling is not indicated by a breaking strength test. It depends on shock, acceleration and deceleration of loads, and contacts of sling that cause abrasion.

Number of rope parts—All ropes tested were either preformed or non-preformed regular lay, of improved plow steel with a fiber core. Rope constructions were 6x19 (6 strands and 19 wires per strand) up to 1⅛-in. diameter. Construction of 1¼-

RATED CAPACITIES FOR WIRE ROPE SLINGS

Rope dia. (in.)	Vertical	Choker hitch	Vertical basket hitch*
	[IN TONS OF 2000 LB.]		
6x19 Improved plow steel, fiber core			
¼	.49	.37	.99
⅜	1.1	.80	2.1
½	1.8	1.4	3.7
⅝	2.8	2.1	5.6
¾	3.9	2.9	7.8
⅞	5.1	3.9	10
1	6.7	5.0	13
1⅛	8.4	6.3	17
6x37 Improved plow steel, fiber core			
1¼	9.8	7.4	20
1⅜	12	8.9	24
1½	14	10	28
1⅝	16	12	33
1¾	19	14	38
2	25	18	49
2¼	31	23	62
2½	38	28	75

*These values apply only when the D/d ratio is 20 or greater.

in. diameter and above was 6x37. A sampling of independent wire-rope cores showed splice efficiencies within the average of fiber-core slings tested.

Type of hitch—When one loop end of a sling is pulled through the other end and around an object to make a lift, the resulting choker (or slip noose) hitch suffers a 25% reduction in strength.

When a basket hitch is used, both loops or eyes of the sling are caught by the crane hook. Normally this doubles the single-rope capacity of the sling—if the diameter (D) of the object or material being lifted approaches 20 times the rope diameter (d).

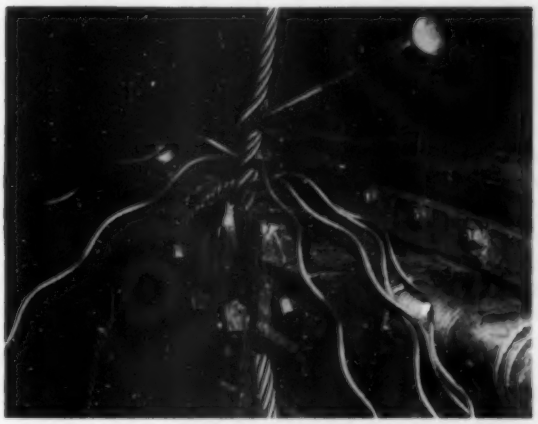
Radius of curvature—If this reduces the "D/d ratio" to below 20, the table above does not apply. Wire rope cannot be doubled upon itself without lowering its lifting capacity. A rule of thumb allows 1½ times a vertical load, not the 2 times of the table.

Although the new tables of rated capacities for hand-spliced wire-rope slings are based on the hand-tucked thimble or loop splice, these values may also be used for a logging splice or Navy Admiralty splice if rope quality and number of tucks are equivalent to that described in photos and captions at right.

Mechanically spliced slings with metallic joints are improvements over hand-spliced slings. Values for the former will be reported in the future by the Wire Rope Technical Board, composed of engineers and representatives from wire rope manufacturers.

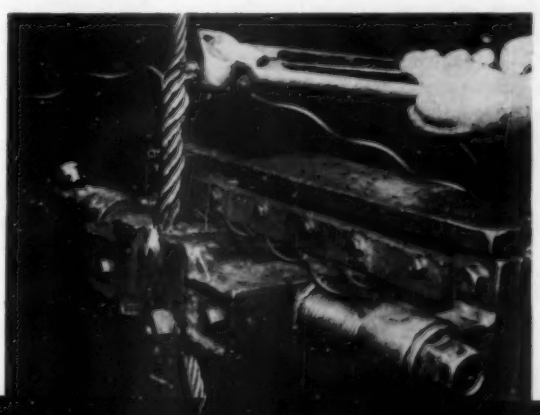
THE ART OF HAND SPLICING

STARTING THE SPLICE. A forming tuck is made by prying two adjacent strands apart. A dead-end strand is inserted into the opening and passed under one, two, or three adjacent strands in the body of the rope. Each of the dead-end strands is given this forming tuck.



MAKING A FULL TUCK. A dead-end strand is inserted under, then rotated 360 degrees around a strand in the rope body. Each full turn is a full tuck. Three full tucks are required, or a full tuck may be replaced with two split tucks (a full tuck of half the strand wires).

SETTING THE SPLICE. A dead-end strand is pulled with considerable force. At the same time, the inserted marlin spike is rotated back to the start of the splice —or the previous tuck—and withdrawn. Strand ends are cut with nippers or torch, and the splice pounded.



SPECIAL REPORT—AIEE's 1961 M

Each year the biggest and most important annual meeting of electrical engineering talent is traditionally held in New York late in January or in the first few days of February. The occasion: the annual winter general meeting of the American Institute of Electrical Engineers. Because of its diversity (this year papers were read on everything from auto transformers to zener diodes) and size (about 3200 members and 900 non-members attended—down about 10% from 1960), a review of the papers offers the best opportunity anywhere for plant men to find out what's new in electrical developments.

Perhaps the most interesting news at the meeting was the announcement that next year, for the first time, the Institute is sponsoring an electrical trade show and exhibit to be held concurrently with the 1962 winter general meeting. Two floors of the New York Coliseum will be turned over to electrical and electronic equipment manufacturers.

There has been a growing need for an electrical show—manufacturers have had to scatter their exhibits among dozens of regional and non-electrical shows never quite adequate for the job. Because AIEE's new exhibit will be held the week following the annual Plant Maintenance and Engineering Conference and Show (Philadelphia in 1962), many plant people may have to choose between the two shows.

Nearly a hundred of the 499 papers were of direct interest to plant operating or staff electrical personnel. Of these, about 40 contained information of widest interest.

Safety holds limelight

The problem of electrical accidents was dealt with in 14 talks scattered through five sessions. Prof. C. F. Dalziel of the University of California (CP 61-237)* summarized the latest world-wide findings on electrical shock hazards and electrocution (a-c over 100 ma., d-c over 500 ma. are considered lethal; 9 ma. and 60 ma., respectively, are hazardous). He discussed European safety developments and exhibited a simple new circuit that will trip a 110- or 220-volt magnetic breaker whenever leakage current to ground (through human contact or insulation failure) exceeds about 30 ma. The device is expected to be commercially available soon.

The problem of electrical safety is inherently tied to the plant's purchasing philosophy. The way to make certain that safety isn't overlooked in purchase (or maintenance or operation either) is to adopt plant electrical engineering safety standards, according to J. W. St. Andre of Kaiser Aluminum and Chemical Corporation (CP 61-108). A good starting point is to study the J.I.C. electrical standards.

Because of the growing use of higher-voltage electrical systems in all types of buildings and operation by relatively untrained personnel, an AIEE task force has drawn up a guide for installing such equipment so it will be as safe as possible (CP 61-123). The paper questions whether the National Electrical Code rules for the installation of equipment over 600 volts are adequate today.

Equipment and methods used in a new integrated testing service for circuit breakers, trip relays, and other equipment in plant power systems were described in a paper by W. A. Weddendorf of Mutual Boiler and Machinery Insurance Company (CP 61-460). The paper contains much useful information on methods of updating circuit protection techniques and equipment.

Procedures for setting up an electrical safety program that works (best safety record in the steel industry) was outlined in a paper (CP 61-423) by J. T. Seaman of U. S. Steel Company's Gary Works.

Safety in rectifier operation was the subject of a preliminary report (CP 61-322) by an AIEE subcommittee. The group tabulated returns from 63 users (60% of all rectifier capacity) in the U. S. and Canada, reported on grounding practices, relative danger of various hazards, system design preferences (such as methods of isolating instruments at various d-c voltage levels) and maintenance safety practices. It reported that annually, two-million man-hours are involved in operation and maintenance of rectifiers, with 21 lost-time accidents (378 man-days) in the last 3 years.

The hazards that actually arise when a typical ungrounded service (4800 v.) is contacted by a much higher voltage system (34.5 kv.) carried on the same pole were described in a paper (CP 61-42) that proposed neutral grounding of the low-voltage system as the answer.

Rules for reducing shock and fire hazards in computer installations are simple and easy to follow. Main points are to avoid inflammable plastics, provide safety interlocks on equipment doors, and make sure that maintenance can be, and is, carried out under safe practice rules, written out (CP 61-440).

Several papers dealt with the hazards of portable tools. J. L. Bennett of Black and Decker (CP 61-263) pointed up the growing demand for double insulation in Europe. However, putting a coat of insulation over a drill or grinder is not always a complete solution, since every insulation eventually deteriorates and exposed insulation is subject to greater mechanical damage. Until more suitable insulating materials are available, only a limited number of hand tools can be successfully double-insulated. And safety must continue to rely on careful grounding of the tool enclosure.

Plants interested in setting up portable tool safety standards can

By G. C. QUINN
Electrical Editor, FACTORY

* Number in parentheses is AIEE's code for the paper. Copies are available at 50¢ each ($1 for non-members) from the American Institute of Electrical Engineers, 33 West 39th St., New York 18, N.Y.

benefit from a list of rules laid down by D. M. Manson of CSA Testing Laboratories in Toronto (CP 61-373). Experience with fatalities and the steps being taken in the Netherlands to reduce portable tool hazards were described in paper CP 61-439. The problems that men interested in electrical safety are faced with is well illustrated in a paper (CP 61-335) by J. B. Hays of Bell Laboratories. No record is ever kept of the fuse that blew or the fault that burned itself out because the equipment was properly grounded. Yet many of these faults would have been perfect set-ups for electrical accidents if plant safety people had not insisted on safety grounding.

New reliability data are available

For years, consulting and design firms, utilities, and some of the larger plant staffs have had to rely on their own records on equipment failures to predict the likelihood of failures in cable, transformers, breakers, etc. Yet such data are vital in making economic decisions on plant system design, modernization, or equipment obsolescence. Users everywhere will benefit from a new survey sponsored by AIEE's petroleum industry committee and reported on an interim basis by W. H. Dickinson (Esso) and C. R. Olson (Westinghouse) in paper CP 60-5044. Seventy plant-years of experience have been tabulated to date in this continuing survey of more than 40 plants throughout the world. About three-quarters of the plants are connected with the petroleum industry, the rest with all types of manufacturing. Failure rates have been broken down by seacoast and inland, domestic, Canadian, and foreign locations. Data collection is now producing meaningful averages and plant engineers can begin to use these data in plant system planning.

A comprehensive analysis of the merits of aluminum vs. steel conduit was reported by Henry Esch and R. B. Brown, both of Kaiser Aluminum and Chemical Corporation (CP 61-31). The paper contains a wealth of information on the best methods of protecting aluminum against moisture and corrosion in moist areas, latest methods in cutting and threading aluminum (portable thread-cutting equipment turns at only one-third the optimum speed) and experience on actual labor costs (about 50% that for steel in the larger sizes).

One of the first interlocked cable installations in a Class I, Group D, Division II (occasionally subject to explosive vapors) area was described in CP 61-169. The authors show substantial saving over conduit and cable, using aluminum ladder-type tray, and tell how to reduce splicing by specifying the cable in a continuous length but with the armor removed and replaced by conduit (sealed at the point of entry) when running through an adjacent hazardous Division I area.

Pilot lights have become such an important component in machine control that trouble little-noticed before must now be guarded against. In his paper (CP 61-106) D. L. Pettit (Square D) described how the push-to-test pilot has eliminated the burned-out pilot problem, but that surface leakage and electrical capacitance (from large masses of adjacent wires) were causing pilot lights to glow "on" when they should not. The answers? Use low control voltage (110-volt or less), connect the lamp across the actual load, use a control relay, or use capacitors or resistors across the pilot lamp primary.

New techniques upgrade maintenance

Some sensible rules on maintenance of storage batteries were outlined by P. B. Wickersham of Philadelphia Electric Company (CP 61-463): Periodic testing of battery connector resistance with a "Ducter" (low resistance ohmmeter) instrument saves needless cleaning. Make sure the battery room is well lighted. Use an explosimeter calibrated for hydrogen before using torches near batteries.

General Electric's B. V. Bhimani announced results of a study to achieve a testing device that stresses insulation in a-c motors, cables, with less equipment than has been required in the past with 60-cycle a-c test devices (sometimes 5 to 10% of the weight of the equipment under test). In his paper (61-138) the author reports that 1/10 cycle per second will give accurate results, thus reducing test equipment size to 1/600 of that formerly required. Actual equipment is not much larger than d-c overvoltage test devices. (The current is alternated by a motor-operated autotransformer in the insulation tester.) Some work remains to be done to prove conclusively whether the new test will rout out incipient faults as accurately as 60-cycle a-c test voltages, but tests to date look very promising. Equipment cost will be small compared to 60-cycle methods.

Preventive maintenance testing of oil-cooled power transformers will become far more reliable with a new method of predicting insulation failure. Studies (61-59) by P. S. Pugh (American Electric Power Service Corporation) and H. H. Wagner (McGraw-Edison Company) show that a portable combustion gas analyzer can spot failure perhaps months or years ahead by sampling a few liters of the vapor above the transformer oil. (Transformer doesn't need to be de-energized.) The method, which measures all combustible gases, is more dependable than checking only for acetylene, which is often absorbed by the oil. The detector can be used in the field or samples can be sent in from the field in evacuated cylinders. A relay-type gas detector is now under development for transformers where the investment for continuous monitoring is justified.

Another big change in transformer technology was summarized in a paper (CP 61-36) by B. F. Allen and G. F. Simmons (both of G-E) showing that a new coolant (C_3F_8) has great advantages over open or sealed (nitrogen-filled) transformers indoors. The authors say in-plant transformers rated over 15 kv. have now become feasible at

150 C. rise. The sealed-in coolant is fireproof, non-toxic, explosion-proof, maintenance-free, and reduces transformer sizes substantially.

Switchgear, breakers improve

A new development in 5-kv. switchgear and accompanying breakers was described by three I-T-E Circuit Breaker Company engineers in paper CP 61-179. Breakers can be disconnected without opening panel doors, closing is done with stored energy (motor or hand), insulation levels have been increased and breakers have greater interrupting ability.

An interesting analysis of what the user wants in switchgear, according to surveys, was presented by W. R. Axon of Federal Pacific Electric Company in paper CP 61-255. A few samples: Lifting units are on the ends of switchgear units—they should be at the front and rear. Buswork extension preparation can't be done without shutdown. Some weatherproof housings for metal-clad gear have an annoying habit of letting in rain.

Most of Europe and Canada has long ago accepted the single-tank three-phase breaker as equivalent to three-tank designs and thus saved investment money, substation space, and installation and maintenance time, according to E. B. Riety of I-T-E (CP 61-133). There is no evidence that they are less safe or reliable than the expensive and bulky three-tank units.

If contact opening time for circuit breakers could be synchronized with the proper point in the current cycle, great improvements in interrupting performance would result, according to tests performed by A. W. Howatson of the University of Sheffield, England (61-3). Under these conditions, increasing the contact opening velocity has little effect on breaker performance.

Five years' use in utilities and industry has proved the capabilities of vacuum power switches, reported H. C. Ross from Jennings Radio Manufacturing Company (CP 61-135). Some have been used in arc furnace control at 12 and 34 kv. In some respects switch capabilities have improved with age.

A round-up of experience and availability information on molded case breakers was presented by J. E. Bayles and R. R. McGee of G-E (CP 61-156). In combination with current limiting fuses, the devices have been thoroughly tested at faults up to 200,000 amperes.

Construction and testing of a new 2.3- to 5-kv. motor starting fuse was described by F. L. Cameron of Westinghouse (61-131). The fuse interrupts minimum, maximum, and intermediate range fault currents without noise or display. Clearing times for faults have been materially lessened, and repeated starting current loads over long periods will not cause unwanted opening.

New tubes are self-testing

Putting off preventive maintenance or guessing about the condition of thyratrons in motor controls can be completely eliminated with the use of a new line of thyratron tubes described by W. A. Maijala and A. J. Humphrey of Reliance Electric and Engineering Company (CP 61-371). A small percentage of neon in the tube's xenon gas causes a tube to start glowing red a short time before the useful life is finished. The phenomena takes advantage of neon's higher ionization voltage, the neon remaining inert until voltage drop in the tube increases near the end of its life.

A new a-c hoist control uses a wound rotor motor with no secondary contactors and with static devices in the primary circuit. A combination of reactor-shunted resistors in the rotor circuit gives optimum speed-torque characteristics. In his paper (CP 61-40) author C. B. Sanborn (Square D Company) describes how maintenance is cut, trolley conductors are reduced, and good hoisting is achieved without an auxiliary electric load brake.

A high-efficiency, completely static variable frequency power source operating from 60 cycles and providing 0- to 15-cycle power to synchronous motors was reported by D. C. Griffith and R. M. Ulmer of Thompson Ramo Woolridge Inc. (CP 61-325). The circuitry is expensive under present market prices for silicon controlled rectifiers, but the advantages over existing equipment give a clue to what industry can expect when prices for SCRs come down. (For instance, any type of load can be handled—even regenerative braking is possible—with surplus energy being fed back into the power line.)

Semiconductors move into plants

A clue to the rate at which solid state thyratrons (SCRs) are moving into wider use was provided by the many papers on this subject. J. D. Harnden (G-E) supplied an up-to-date list of all types available from all manufacturers in CP 61-332. The author's company is manufacturing units rated at 150 amp., 400 volt. Usage could reach 50,000,000 units by 1965. Four other G-E authors (CP 61-476) provided a round-up of the latest installations. For those of you who haven't realized how fast these units are moving into industrial power a paper like this can be quite a surprise. (See FACTORY, December 1959, p. 82).

Some of the false data resulting from testing semiconductors with the wrong kind of testers were explained by E. J. Diebold of International Rectifier Corporation (CP 61-206). Many of the readings on rectifier performance accepted for fact in maintenance testing are useless.

Computer studies are invaluable

R. S. Forbes, Jr., of Du Pont, in his paper (CP 61-209) outlined how extensively his company is using computers for system studies—and they're not all big systems. The paper lists many of the questions that can be answered in a computer study. Equipment manufacturers have computers already programed for plant surveys, so setting up is not a lengthy job. Often equipment investment can be reduced since the area of the unknown in faults or transients is eliminated.

There were many other items of interest. They ranged from a new type of conference speakerphone for conference rooms, which cuts out annoying room "boom" and eliminates "cutting in" by chronic conversation interrupters, to an economic study of multiple vs. single-heat pump air conditioners for office. (There's much to be said in favor of multiple units.)

Could this strike have been avoided? How? Compare your solution with that of labor expert . . .

GEORGE ODIORNE

A series of seemingly harmless decisions by this manager brought on a surprise strike. A vote of confidence in his men for their low scrap losses and some promising new machines triggered all his troubles.

The strike vote was taken at about 8 o'clock Monday evening, and by Wednesday evening the local had formed a picket line around the plant. Only 300 employees worked for the Figby Packaging Company, and this was their first strike. Figby's President Sadly really couldn't understand it, and showed his hurt when he talked to the state negotiator who called on him to try to arrange a settlement.

"I've always tried to deal fairly with the union," said Mr. Sadly. "In fact, a number of times when the rest of the industry was down with labor troubles, we had no difficulty at all. We have one of the most liberal agreements in the industry. If you look at the Blue Book for this industry, you'll see that we pay among the top two or three rates going. And our hourly rates, if you include the incentive, are about 40 cents above average."

"Uh-huh, tell me more."

"Well, take the incentive plan. Maybe the trouble we've had in the past four or five months has something to do with the strike. Maybe they're striking just because they're angry about it. But if that's what's eating them, why don't they come in and talk it over like men instead of shutting down my plant?"

"You've had some trouble with your incentive plan?"

"Some. You see, we've had a generous incentive plan since the end of World War II. Up until six months ago, we always paid according to incentive, with all defective work taken out of the bonus allowance. That is, if a man turned out bad work he didn't get credit for it in figuring his incentive. As a result, we didn't have much bad work. In fact, it became so negligible our industrial engineer suggested that we forget about it. The cost of deducting it and refiguring the bonus wasn't worth while. Spoilage had been running under a tenth of 1% for over two years. That's when we made the change."

"You changed the incentive plan?"

"Yes, and we're sorry! We told the boys that spoiled work would be paid for the same as good, because they no longer turned out any scrap to speak of. I also warned them that if it got out of line, we'd return to the old system of taking spoilage off their bonus. Well, the first thing we knew the spoilage was up to 1%, then 2%, and finally one week it went to 5%. This was a 5000% increase in spoilage! I blew my lid."

"When was this?"

"The date? Well, about five months ago we changed the bonus plan . . . and two months later we faced up to the fact that spoilage had reached 5%. It was completely out of hand. The next day I pasted an order on the bulletin board, stating that thereafter all spoilage would be deducted from the figures for bonus production."

"This was three months ago?"

"Just about. We knew the contract was due to run out and wanted to return to the old system before we started negotiating. Otherwise, the union might try to keep the new system, and we were determined that we wouldn't put up with it—not with the spoilage that high. Not only that, but with the new machines acting up, we didn't feel we could just let the employees drift or we'd completely lose control of costs in the shop."

"New machines?"

"Yeah, we bought a batch of new machines from Germany. They're

Newest FACTORY feature

There were about 3300 strikes in 1960—a year the Bureau of Labor Statistics calls "one of the most peaceful . . . in the postwar period." Some 20-million man-days were lost. Much of this waste can be laid at management's door. Often, a little foresight, a little insight, a little sensitivity could have headed off the labor trouble. To prove it, this new FACTORY feature will present expert analyses of a series of *actual* cases (disguised, of course) of strikes that could have been avoided—with honor. The feature will appear bi-monthly.

high-speed automatics, and on packaging machinery you can't beat those Germans. Once we get the bugs out of them, and our mechanics learn to adjust them to run at full speed, we'll be a mile ahead of the industry. Just when I thought things were going our way this labor trouble comes along."

"When did you get the new German machines?"

"Oh, about six months ago. But we didn't get them operating until about four months ago. They gave us trouble from the start, since our mechanics didn't know much about them. Jams in the feed, doubles through the folder—we had ruined packages until you couldn't carry them away in a truck!"

"The new machines made a lot of spoilage?"

"You should see it! Simply pushing the button ruined more stock than our old ones used to in a month. But once we get them straightened out, they will be worth the trouble. They save labor, because they produce nearly twice as much as the others. We expect to be able to knock off the night shift once we get under way. That will eliminate all that premium pay, plus the overhead of night supervision, lights, utilities, and all that. Of course, we'll probably have to put on a night shift again in a couple of years—if we get all the new business these machines can handle. The sales manager tells me if we can shave our price to the customers, we can put our competitors right on the deck, and take over a big share of the market. Everything was looking so rosy, and now a strike."

"When you decided to put the bonus plan back on the old system—when your spoilage got out of line—was this spoilage on the old or the new machines?"

"I see what you're getting at. Sure, it was all on the new machines, the old ones didn't produce much. But we aren't exactly fools. We remembered that we'd cut spoilage on the old ones by taking it off bonus, and it's simple logic to apply what has worked well in the past to a new situation."

"What were the workers' reactions to your changing back to the bonus plan where they lost income for spoiled work?"

"Well, naturally, they didn't like it; they put in a grief. I told them that they had an easy way to cut out the lost pay, and that was to quit producing junk. They said it was the fault of the machines. But it's people that run the machines. To prove I was right, you can look at the spoilage record during the past three weeks. It dropped to 4%. This shows that we were right to reinstate the old bonus system—deducting spoilage."

"Did this bonus subject come up during negotiations?"

"Oh sure. They tried to get an adjustment in hourly rate to make up for the loss of pay due to spoilage, but we couldn't do that. Once they got the spoilage down to zero we'd be behind in costs. Besides, our hourly rate is among the highest in the industry already. This would put us away out on the moon some place. I think they're being a little bullheaded about this whole thing. But you aren't here to listen to all this. We both want to settle this strike and get them back to work, so let's get busy, huh?"

George S. Odiorne is director of the Bureau of Industrial Relations, and Professor of Industrial Relations at the University of Michigan. Earlier, he was Assistant Director of Personnel Administration for General Mills, Inc. He has also been Personnel Division Manager for the American Management Association, and Chairman of Management Services at Rutgers University (N.J.). His business experience includes 10 years as supervisor at American Can Company, and consulting assignments with such companies as Minneapolis-Honeywell Regulator Company, Baxter Laboratories, Northwest Bancorporation, and General Mills.

Concurrently with his business experience, Professor Odiorne taught economics and management at Rutgers and New York Universities. He is an active member of the American Society of Training Directors, the American Economic Association, and the Academy of Political Science. He is co-author of several books, and has had over 80 articles published in industrial and personnel magazines.

This strike could have been avoided

Timing during contract negotiations is more than saying the right things at the right time in bargaining. It entails some long-range thinking between negotiations. Mr. Sadly didn't consider the effects of changing his bonus plan only five months before contract renewal. The union had nothing to lose by accepting his offer to ignore spoilage, making his unilateral announcement on the bulletin board easy to accept.

It was another error in timing to change the bonus calculation just before introducing new machinery. Fast new machines raise the specter of automation, which often makes workers feel threatened.

This double play in wrong timing undoubtedly caused the workers to become jittery and take a firm stand behind the union during negotiations. Their security and income were threatened by the new shop changes. Although they didn't know (we may assume) about the possibility of ending the night shift, they might have deduced it simply from knowing the new machines produce at higher speed. The low-seniority people, who would be hit first by a layoff, would naturally follow their own interest and security—in this case, by resisting the reinstatement of the old bonus plan, and by demanding higher hourly rates to compensate for the spoilage losses they felt the new machines would cause.

The fact that the workers are higher paid than most others in the industry isn't very persuasive when a group feels as insecure as this one did. Mr. Sadly could have left the old bonus plan alone and still have had the same trouble once the new machines came into operation. A better plan might have been to establish selective spoilage penalties for both new and old machines.

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FACTORY EQUIPMENT NEWS

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BY JET SPRAY PERMITS . . .

Easy handling of dusts, granules

Verticone, a new approach to dust control and automatic processing of bulk materials is now available. This continuous flow machine wets down, in controllable quantities, granules or powders for waste disposal. Or it adds liquids to solids in processing applications.

No more batching, slurrying, or balling of dusty materials. No more tumbling to coat, impregnate, or dye granules. Compact, cylindrical unit adapts to most equipment.

Material fed into distributing cone at top falls off base in shape of thin-walled (¼ to ⅜ in. thick) hollow cylinder. Spray jet inside this cylinder applies solution (Compound MR is recommended for dust). All solids are thus wetted down by as little as 1% additive. Dropping into base of unit, treated material is discharged by rotary table feeder onto conveyor or chute. Models handle from 150 lb. to 150 tons of material per hr., depending on bulk density. *Johnson-March Corp.* (Circle 89)

You can blow with its top

It sucks and blows, air sweeps and sprays—one compact, mobile unit does it all. Power attachment on top can be demounted in seconds and used as hand- or shoulder-carried air sweeper or vacuum. Quik-Vac cleaner picks up wet or dry filings, chips, dirt, litter, liquids. Long extension reaches to overhead rafters, pipes, ceilings, walls. Carrying cart has easy-grip handle and accessories bag. Large back wheels help ease it up and down stairs. Supplied with two-speed power unit, 1½- or 2-in. hose size, optional attachments. *Clements Mfg. Co.* (Circle 90)

91—Mobile radio-telephone is low-cost, 4-channel, 150-mc. unit which uses public land phone lines to realize nearly unlimited coverage. Compact AChieverfone consists of receiver-transmitter and control head, both easily mounted in carrier cab. *General Motors Corp.*

92—Steel nesting pails, with 16-lug cover or ring seal, do not stick together when nested. Built-in depressed panel on cover "locks" with overhead pail when stacked full. Height of 16 nested pails equals stack of 5 full ones. In 28, 26, 24 gauge. *Bennett Industries, Inc.*

93—Tin-a-lum, fluxless solder, melts at low temperature, thus eliminating metal destruction under heat. With its high tensile strength, it could replace welding or brazing at lower cost, less time. For aluminum and alloys, zinc, tin, magnesium. *Metals for Industry, Inc.*

Tears paper to shreds

Paper shredder is low-cost, streamlined machine that destroys paper sheets in seconds by reducing it to thin strips. Delivers shreds directly to waste basket. No larger than typewriter, it fits into any décor. Is safe, quiet, easy to use. *Electro-Shred Corp.* (Circle 94).

Turn the page

In goes Solnus . . . out goes compressor trouble

By using a Sun Solnus oil, this man is eliminating dangerous carbon build-up—the chief enemy of compressors and the cause of most maintenance shutdowns.

Solnus oils have proved to be ideal compressor lubricants. They form very little carbon . . . and what does form is a soft and fluffy kind that blows away easily from valves and exhaust parts. Because carbon does not build up, ring grooves and air lines stay clean.

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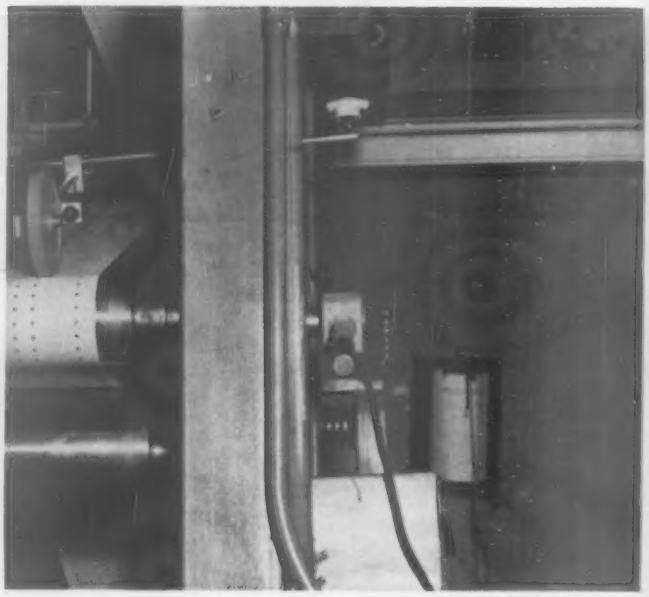
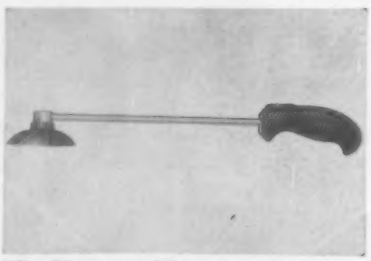
Control and measurement of material on spools, rolls, or sheets got you stumped? Then this footage counter, a lineal measuring device with photoelectric sensor, is what you need. Sensing wheel and high-speed pre-settable counter measures and records in yards, feet, tenths of feet, or inches. Handles paper (photo) metal, cloth, rubber, plastics, and glass with no load drag as with mechanical registers.

For operations in sequence, multiple predetermined settings may be selected. For example, in a 10,000-yd. cycle actuated by multi-preset counter, electronic circuits sound warning bell at 9500 yd. At 9900 yd. machine slows down and at 10,000 yd. it stops completely.

Footage counter unit, when used with other of the company's photoelectric devices, can detect uneven winding, punching, or web break. Also supplied with magnetically actuated pick-ups. *Standard Instrument Corp.* (Circle 95)



96—Mobile water chiller eliminates need for permanent installation, special plumbing, piping. Multitem moves from one process to another to give permanent trouble-free operation at fully rated capacity. Safety thermostat prevents freezing. *Application Engineering Corp.*



98—Vacuum lifter handles nonporous parts by striking sharply with cup section and lifting. Flap in pistol-grip handle controls pick up and release with thumb pressure. In 12-, 15-, and 18-in. lengths, with 2¼- and 3⅛-in. replacement cups. *Stilson Tool, Inc.*

101—Electronic governor precisely controls speeds of shunt wound d-c motors to 1 hp. Maintains speed at selected values despite variations in load, line voltage or motor temperature. Can be used in other equipment or as self-contained unit. Operates on 230 v. *Linde Co.*

97—Pressure-sensitive bumper, for towline trucks, automatically releases tow pin and applies brake on contact with stop, obstruction, another truck, or people. When released, it re-engages towline. Adapts to any truck up to 4000-lb. capacity. *SI Handling System, Inc.*

99—Modular boxes, molded from polyester resin and glass fiber, fit into parent box (about 21x11x5½ or 3 in.) in various combinations. For dust, moisture-free parts storage, and handling. Withstand abuse. *Molded Fiber Glass Tray Co.*

100—Portable air filters clean inlet or make-up air on vacuum loading systems where sanitation or prevention of product contamination is important. Two types—vent and intake filter. Both have highly efficient replaceable cartridge that can be washed, re-used. *Fuller Co.*

102—Safety glasses that are highly styled should satisfy aesthetic demands of blonde, brunette, or red-headed women workers. Lenses, held in deep frame grooves, snap out for replacement. Two-tone or solid color frames, two lens sizes. Side shields optional. *Ray-O-Vac Co.*

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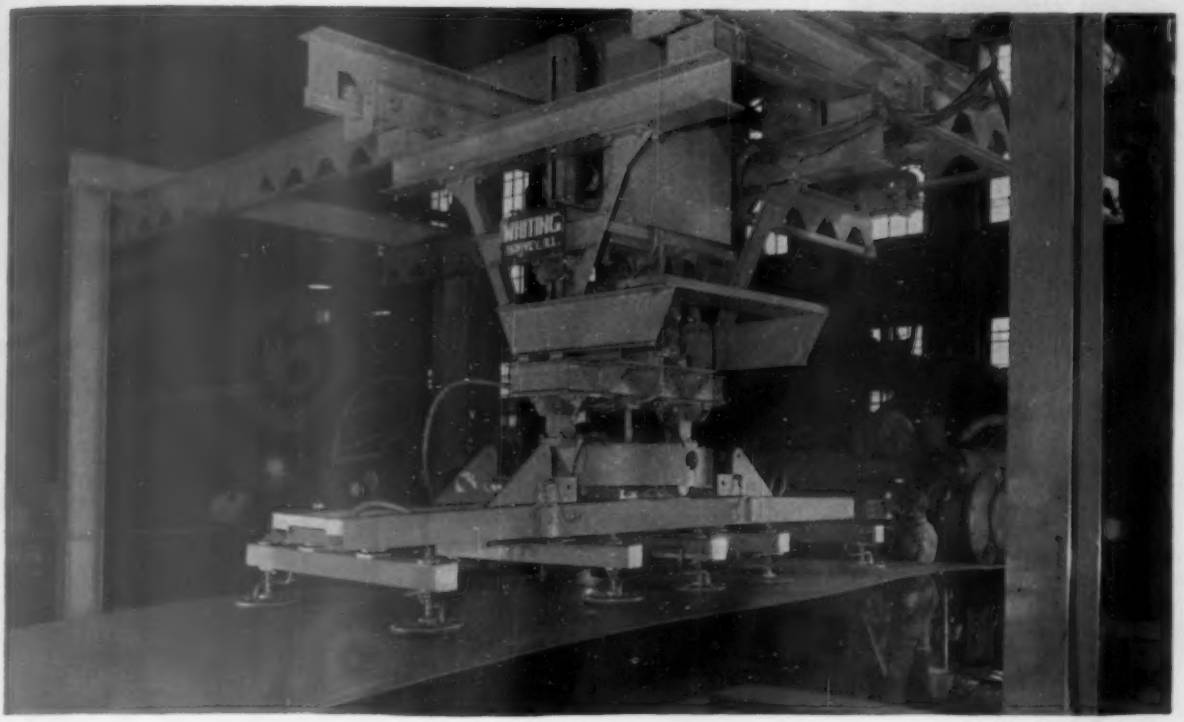

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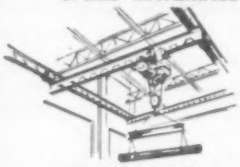
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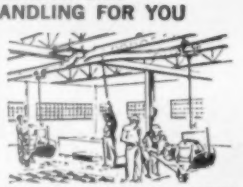
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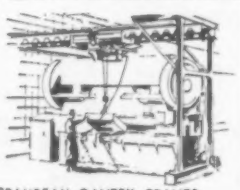
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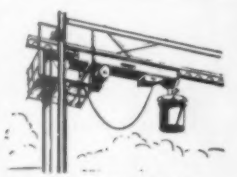
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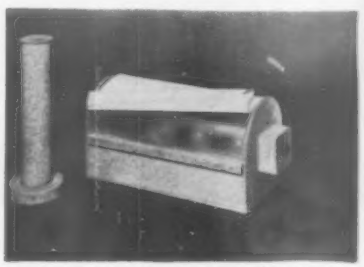
103—Portable metal saw cuts stainless steel, hard alloys, other abrasive materials at 1000 spm., mild steel and non-ferrous metals at 1400 spm. Two speeds permit very fast cutting of different gauges and densities of metals; long stroke prolongs blade life. *Skil Corp.*

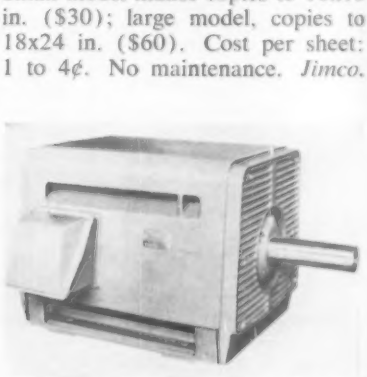
104—Adjustable motor base, when used with proper sheaves, provides complete drive for low-speed applications in ¾ to 10 hp. Speed controlled with simple handwheel or remotely. Little maintenance; motor can be mounted at angle to base. *Speed Selector Inc.*

105—Cable tracer spots up to 10 conductors (singly or in pairs) at a time without buzzers, bells. One man plugs conductor ends into numbered station blocks. Tester's (photo) matching numbers light to identify conductors. No chance for error. *Pyramid Instrument Corp.*

106—Mobile 2-way radio offers 15 watts of power for VHF-FM audio operation in low band (27-50 mc.) and high band (150-174 mc.) at $419. Lightweight, easy-to-mount Pacer just right for companies where price is consideration. Battery drain 4.2 amp. *General Electric Co.*

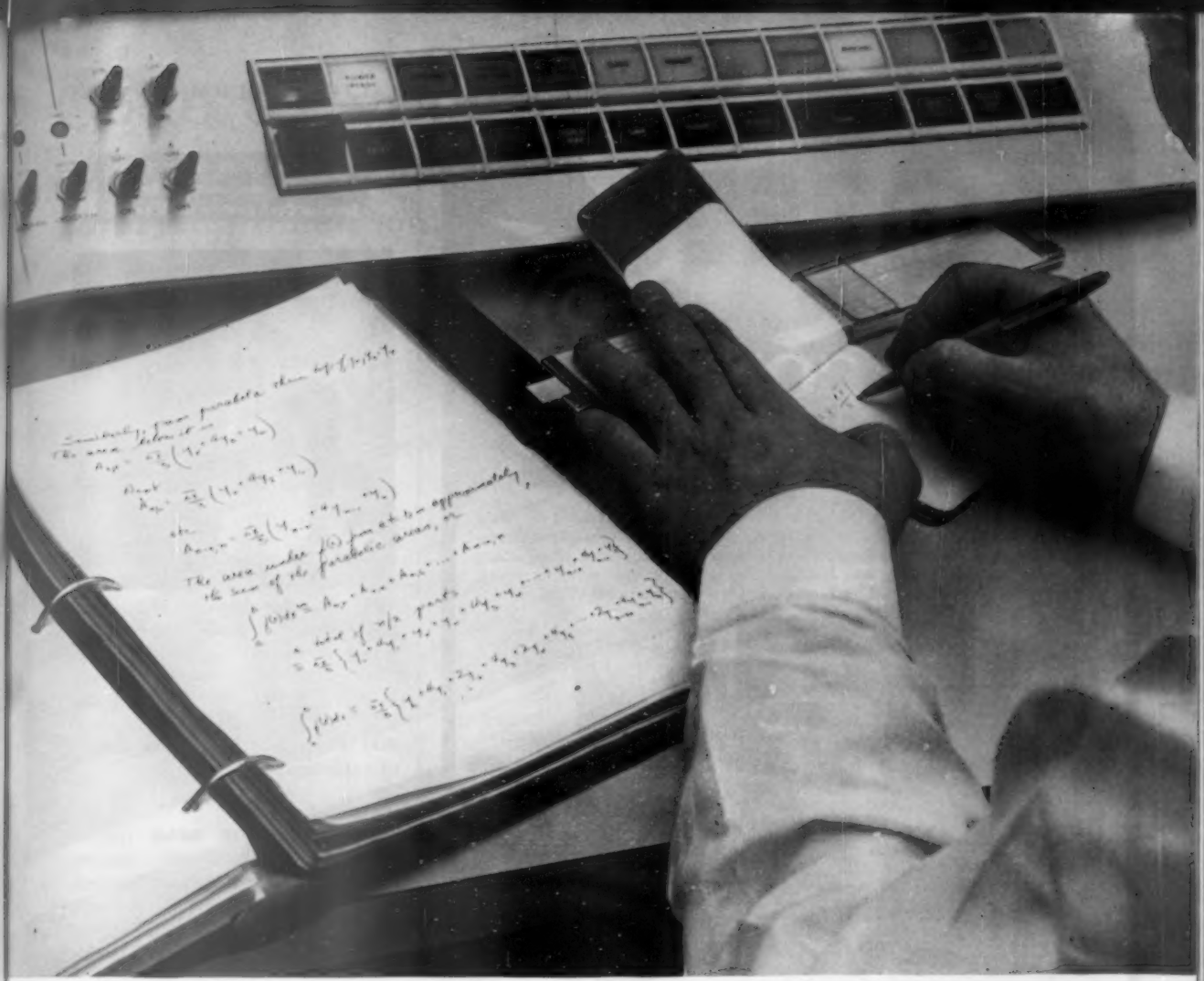


107—Portable copying machine reproduces blue line on white copies of sketches, line drawings, printed matter with high clarity, and fast. Small model makes copies to 10x13 in. ($30); large model, copies to 18x24 in. ($60). Cost per sheet: 1 to 4¢. No maintenance. *Jimco.*



108—A-C motor uses round stator in nearly square frame to achieve improved cooling, small dimensions, 125 to 300 hp. range. Louvered openings removable for easy servicing. With sleeve or ball bearings, 220 to 550 v., 3600 to 900 rpm. *Reliance Electric & Engineering Co.*

Turn the page



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BULLETIN G-30—Describes the DAY Type "RJ" filter. An all purpose, versatile unit. Bulletin gives operating features, dimensions and specifications.

BULLETIN D-20 — Dual-Clone dust separators — noted for their low resistance and high cleaning efficiency. Easy to install, no maintenance, no moving parts.

BULLETIN I-585 — Industrial Fans. Complete with helpful selection charts, capacity tables, dimensions and specifications. Information on special types and arrangements included.

BULLETIN F-75 — Reverse Jet Dust Filter Facts. Complete with specifications, typical equipment layouts, capacity and performance tables for DAY type "AC" filter.

BULLETIN N-578 — Gives complete information about Style "A" rotary valves. Construction features, specifications, dimensions and applications.

"SCHLITZ DEFEATS DUST" — FOOD ENGINEERING magazine reprint describes all out dust control for 3½ million bushel Schlitz grain elevator. Request Bulletin "Schlitz" Defeats Dust."

"EFFICIENT DUST SNATCHERS" — Bulletin describes DAY's part in providing maximum safety and good housekeeping for starch packing building of large food processor.

BULLETIN 510—DAY Unit Dust Collectors. Complete, low cost unit designed for plants or applications where central dust control systems are not practical.

BULLETIN 576 — "HV" heavy duty dust separator. Rugged construction and lower initial cost than many light gauge galvanized type cyclones.

DAY SINCE 1891

The DAY Company

858 Third Avenue N.E.
Minneapolis 13, Minnesota

In Canada:
The DAY Company of Canada Ltd.
15 Brydon Drive, Rexdale (Toronto), Ont.

Please send Bulletins checked below:

☐ Bulletin G-30 ☐ Bulletin F-75 ☐ "Efficient Dust Snatchers"
☐ Bulletin D-20 ☐ Bulletin N-578 ☐ Bulletin 510
☐ Bulletin I-585 ☐ "Schlitz Defeats Dust" ☐ Bulletin 576

Name_____

Company Name_____

Address_____

City_____ State_____

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

109—Portable horn, sounds warning signal for work crews, plant watchmen, patrolling guards. Actuated by pushbutton or thumb lever. Powered by liquefied Freon in disposable pack which lasts for about 800 loud, clear blasts. No danger of explosion. *Ferrell Mfg. Co.*

110—Conductivity meter (pocket size) for water treatment systems, permits adding chemical immediately to correct imbalance. No waiting for laboratory checks. Direct-reading Dip-Chek uses 2 penlite batteries. Scales from 100 to 5000 ppm. as NaCl. *Comroe Labs, Inc.*

111—Horizontal boring mill, 3-in. bar, eliminates metal-to-metal wear by having table and saddle ride on compressed air and oil. Results in smooth, lubricated traverse for feed and rapid return. Air volume need is minimal; pressure, fraction of 0.0001 in. *S & S Machinery Co.*

Turn the page

Code as you go!

no mixing . . . no brushing . . . no drying time required

Get immediate safety and accurate identification with plastic tapes from 3M

Be sure pipes and ducts are identified correctly and quickly. Color code as you go with "Scotch" Brand Colored Plastic Tapes. Because tape is fast, clean and easy to apply, there's less chance of mismarking pipes . . . or of forgetting the job. No buckets to carry. No colors to mix. A man can carry several colored tapes in one safe trip. Finish the job in less time than it used to take to clean up after using conventional coding materials. "Scotch" Brand Plastic Tapes resist acids, alkalis, greases, salts and most solvents . . . stay bright and tight for years . . . yet are easy to remove or change. Choose from eight all-purpose indoor colors: yellow, red, green, black, orange, blue, white, or brown. Five colors also available for all-purpose outdoor applications.

TRY THIS METHOD. Ask your 3M Representative or "Scotch" Brand Tape Distributor for a demonstration, or write: 3M Co., 900 Bush Ave., St. Paul 6, Minn., Dept. IBD-31.

These are the codes which use yellow tapes. For a complete list of colors and their suggested codes write us.

High-Pressure Steam

Low-Pressure Steam

Process

Minnesota Mining and Manufacturing Company

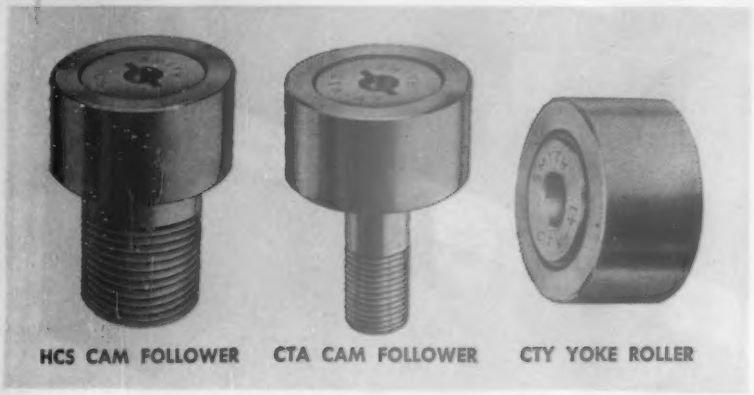
. . . where research is the key to tomorrow

3M COMPANY

"Scotch" is a registered trademark of 3M Co., St. Paul 6, Minn.

SMITH cam followers and yoke rollers

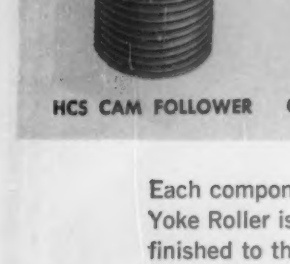
engineered to precise standards



HCS CAM FOLLOWER CTA CAM FOLLOWER CTY YOKE ROLLER

Each component of every Smith Cam Follower and Yoke Roller is carefully engineered, machined and finished to the most exacting standards and dimensions. As a result, Smith Cam Followers and Yoke Rollers perform with uniform reliability.

Standard Smith "CTA" (interchangeable) or "HCS" (High Capacity Stud) Cam Followers and "CTY" Yoke Rollers will give you outstanding performance with long, trouble-free life.



Smith/Align Bearings are new self-aligning bearings that are specifically designed for applications which are extremely critical—where dependable performance is vital and failure too costly to tolerate. Smith/Align Bearings will function smoothly, without bind, yet with as little as .0002" clearance between ring and ball.

Better distributors throughout the country stock and sell Smith Cam Followers and Yoke Rollers.
Write for the handy, quick reference data sheets on Smith Cam Followers and Yoke Rollers and for full information on Smith/Align Bearings.

Smith Bearing Division / Accurate Bushing Company
445 North Avenue, Garwood, New Jersey

Manufacturers of: Needle Bearings, Cam Followers, Yoke Rollers, Jet Engine After Burner Rollers and Bearing Assemblies, Airframe Standard and Special Bearings, High Temperature and Severe Wear Precision Parts.

For more facts Circle 429 on Reader Service Card

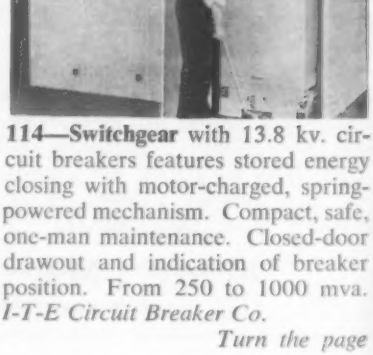
FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

112—Adjustable snap gauge makes go-not-go gauge obsolete. Retracting anvil allows placement of gauge and measuring without force. Five sizes to 8 in. can be used with three interchangeable gauging heads having 20-, 50- and 500-millions scales. *Mahr Gage Co.*

113—Duratrem flooring withstands solvents, chemicals, heavy trucking. Has light gray, non-slip finish. Easy to apply. Can be feather edged, needs no compacting and normally no primers. Limited use after 12 hours' installation, completely dry after 24 hr. *Tremco Mfg. Co.*



114—Switchgear with 13.8 kv. circuit breakers features stored energy closing with motor-charged, spring-powered mechanism. Compact, safe, one-man maintenance. Closed-door drawout and indication of breaker position. From 250 to 1000 mva. *I-T-E Circuit Breaker Co.*

Turn the page

EX-PRESIDENT. He laughed when competition installed Typhoon. He cried when they underpriced him, thanks to the resulting increased production that lowered per-unit cost. He's still in the president's office...sweeping up after hours.

EX-TREASURER. He insisted air conditioning was too expensive. Ignored the fact that Typhoon easily pays for itself through increased productivity. Disregarded Typhoon's financing plans that save working capital; even provide tax benefits. He's still handling money...collecting unemployment checks.

EX-PLANT MANAGER. He fought air conditioning despite mounting inefficiency. Refused to study data that proved Typhoon air conditioning reduces errors and absenteeism while increasing man-hour productivity. He's still connected with production...working a punch press.

EX-PURCHASING AGENT. He thought any air conditioning would do. He forgot that Typhoon offers the broadest choice of units, customized for special needs at little or no extra cost. The brand he recommended was expensive to install, operate and maintain. Management still calls on him... whenever a faucet needs fixing.

The path to success is clear. You can calculate the exact percentage of increased production needed to pay full costs of owning and operating a Typhoon system...as low as 2% for general factories, depending upon size of area to be cooled. Get cost-calculating formula and data from your Typhoon dealer—or mail coupon today.

Water Cooled Self-Contained Packaged Units 3 to 75 Tons

TYPHOON
HUPP

TYPHOON AIR CONDITIONING DIVISION, HUPP CORPORATION 11-3-1
505 Carroll Street, Brooklyn 15, New York
☐ Please send full data, including cost formula.
☐ Have representative call for an appointment.

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FIRM_____

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CITY_____ ZONE_____ STATE_____

Snap-on®

Electric IMPACT WRENCH

You Handle All These Jobs FASTER...EASIER

- Tighten and loosen nuts up to 90% faster than by hand
- Turn most pullers
- Drive and remove screws, lag bolts
- Remove and replace studs
- Remove carbon, scale, rust, paint
- Drill and ream holes
- Tap threads
- Many other jobs

This SNAP-ON electric impact wrench is one of the handiest tools in the shop. It works so fast and easy your men can turn out double and triple the work without even thinking about it.

There's extra safety, too, in an impact wrench. A man can get up on a ladder or work in awkward positions without fighting the side thrust of a regular electric tool. Also, on drill or other work it won't burn out if the attachment gets stuck.

The tool's one-half inch square drive takes sockets 3/8 to 1-1/16 in. — many accessory tools available. Two models — 115 volts, 220/230 volts. Tool is top quality throughout — has many construction advantages. Get full details from your SNAP-ON representative. Factory branch warehouses in principal industrial centers. Or write us.

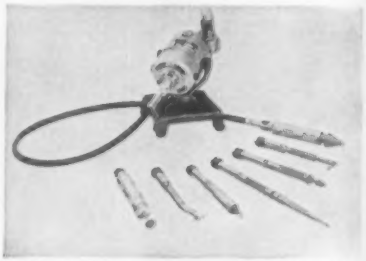
SNAP-ON TOOLS
FOR ALL INDUSTRY
8044-C 28th AVENUE • KENOSHA, WISCONSIN

For more facts Circle 431 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.



115—Miniature power tool, for grinding, polishing, deburring, marking, does man-size job at midget price. Portable, bench-type unit has flexible shaft, 1/10-hp. motor, two speeds (to 12,000 rpm. on direct drive). Variety of handpiecs. $74 to $87. *Foredom Electric Co.*

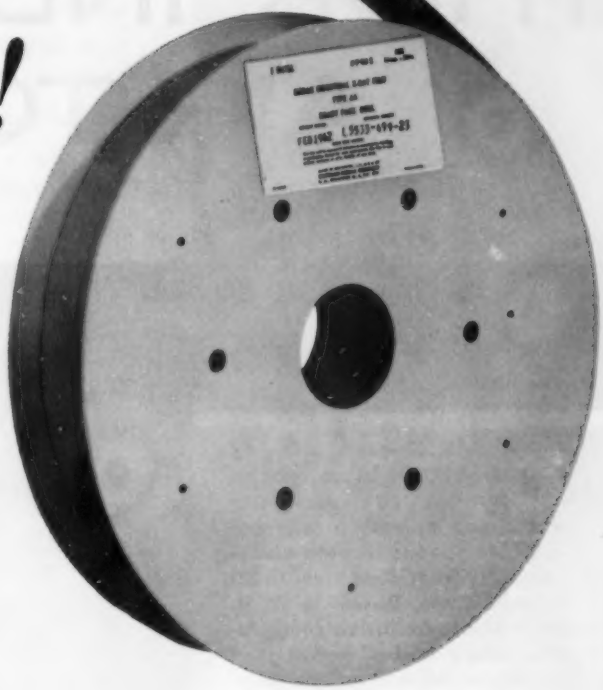
116—Cardboard carton shredder chops boxes to 4- to 12-in. pieces to simplify handling of discards. Can be manually or conveyor-fed, then discharged directly, or through airflow system to bins that feed baler or incinerator. For any carton size. *Mitts & Merrill.*

117—Portable nibbler cuts 8-gauge mild steel, copper to 3/16 in., quickly, easily on job. Punches out small piece, leaving smooth edges. For heavy-duty—develops pressure of 2-ton punch press. Automatic oiler lubricates work. Rated load 600 spm. *Black & Decker Mfg. Co.*

Turn to page 116

NOW!

READY PACK IN ROLLS...

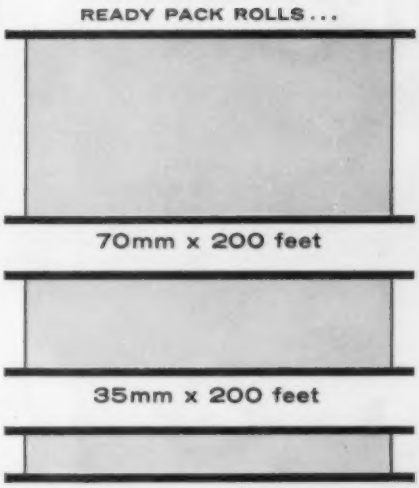


Kodak Industrial X-ray Film, Type AA and Type M in 16mm, 35mm and 70mm widths, 200-foot lengths

Here is America's preferred Industrial X-ray Film in a new convenient form—in 200-foot rolls, and in three widths. Ready Pack rolls are the answer for panoramic or moving slit methods of radiography of thin-wall vessels and pipe, honeycomb, circumferential welds, etc. Unroll the needed film, cut it off, seal the ends with opaque, pressure-sensitive tape. You are ready to inspect aluminum or magnesium alloys, thin steels or anything where lead screens are not required.

Ready Pack rolls are supplied on cardboard cores, 12 inches in diameter. The film is enclosed in a light-tight wrap-around sealed covering, without interleaving paper. It keeps clean and does away with darkroom loading. For processing, just separate the wrap along the sealed edge and remove the film.

For further information or to order a supply, contact your x-ray dealer or write us for a Kodak Technical Representative to call.



*For the present this size available only on a special order basis.

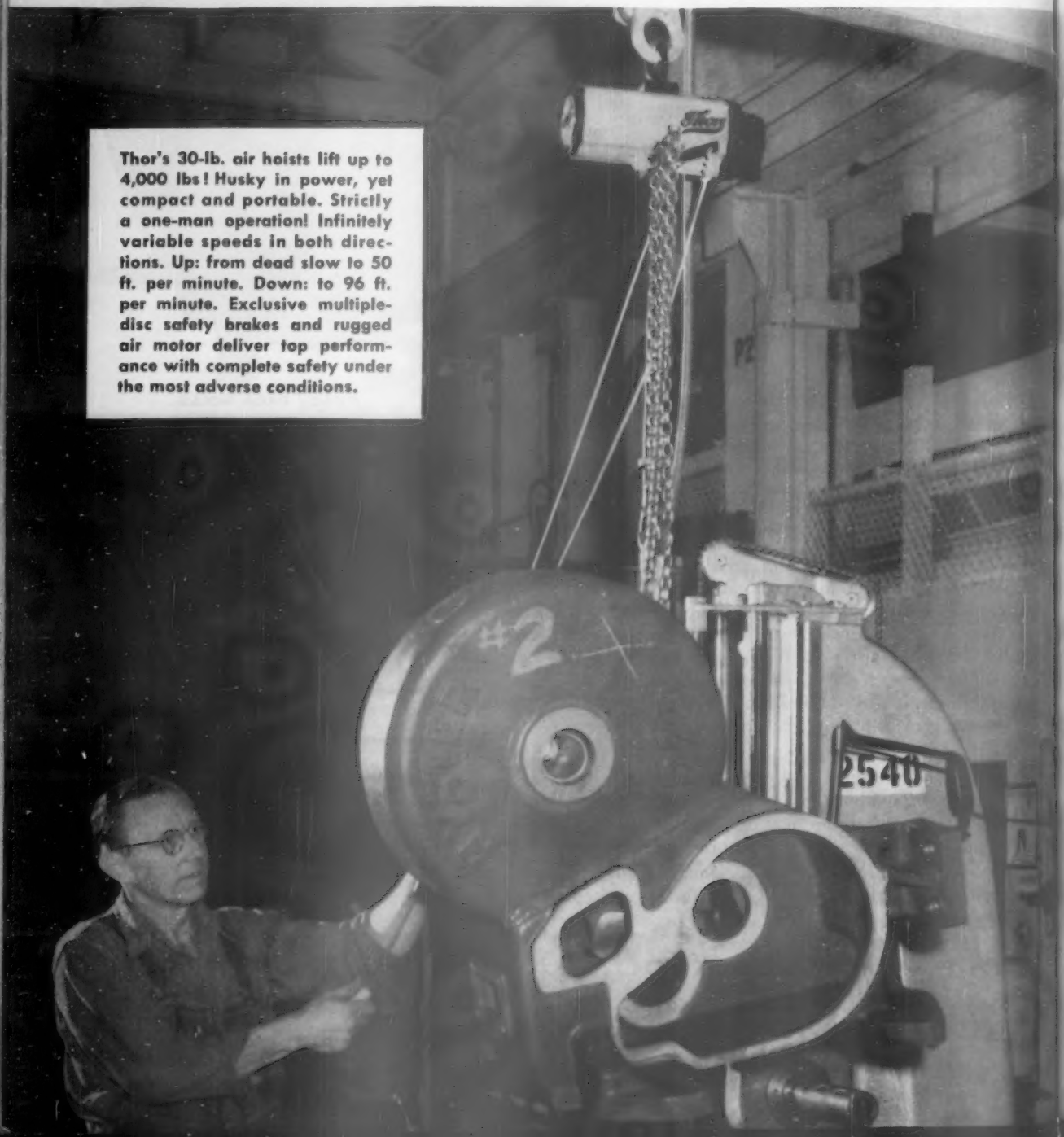
EASTMAN KODAK COMPANY
X-ray Sales Division, Rochester 4, N.Y.

Kodak TRADE MARK

For more facts Circle 432 on Reader Service Card

Lift up to 4000 pounds with new 30 lb. air hoists

THOR INDUSTRIAL AIR TOOLS



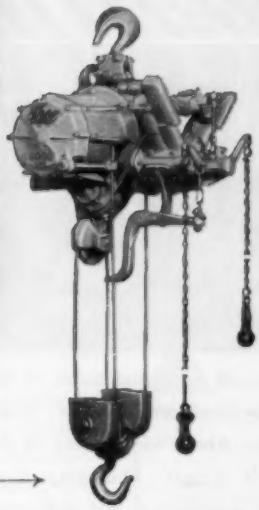
Thor's 30-lb. air hoists lift up to 4,000 lbs! Husky in power, yet compact and portable. Strictly a one-man operation! Infinitely variable speeds in both directions. Up: from dead slow to 50 ft. per minute. Down: to 96 ft. per minute. Exclusive multiple-disc safety brakes and rugged air motor deliver top performance with complete safety under the most adverse conditions.

There are as many ways to save your money on these two pages as there are Thor models of the tools shown. Every hoist, hammer, chipper, nut runner and grinder has been designed with only one purpose—reduce your costs by increasing production. That's been Thor's business now for 68 years. Make it your business to find out how Thor can help you. A nationwide network of factory experts and distributors are at your service. The Yellow Pages list them. Or write us at Thor Power Tool Co., Aurora, Ill.

THOR AIR IMPACT WRENCHES save time and money on nut running, screwdriving, reaming, tapping, applying and removing studs. Capacities from ¼" to 1¼".

THOR MULTIPLE AIR NUTSETTERS assure greater accuracy of torque control; definite savings over individual tool applications involving close patterns.

IT'S THOR POWER that does it! Thor air chipping hammers are famous for it. That, plus stay-on-the-job durability, economy and ease of operation. Complete selection of plate and spool valve chipping hammers; scaling hammers; riveting hammers.



LARGE CAPACITY HOISTS TO 3 TONS. Up to 90% faster. No jerking or vibrating. New, more powerful motors with mufflers. Thor has the hoist to complete it—any job faster and safer!

GET 50% MORE grinding power, 6 times quieter. Thor air grinders, available in forty models. Cup grinders, wire brushing machines and disc sanders.

THOR POWER TOOL COMPANY
AURORA, ILLINOIS

Thor POWER TOOLS

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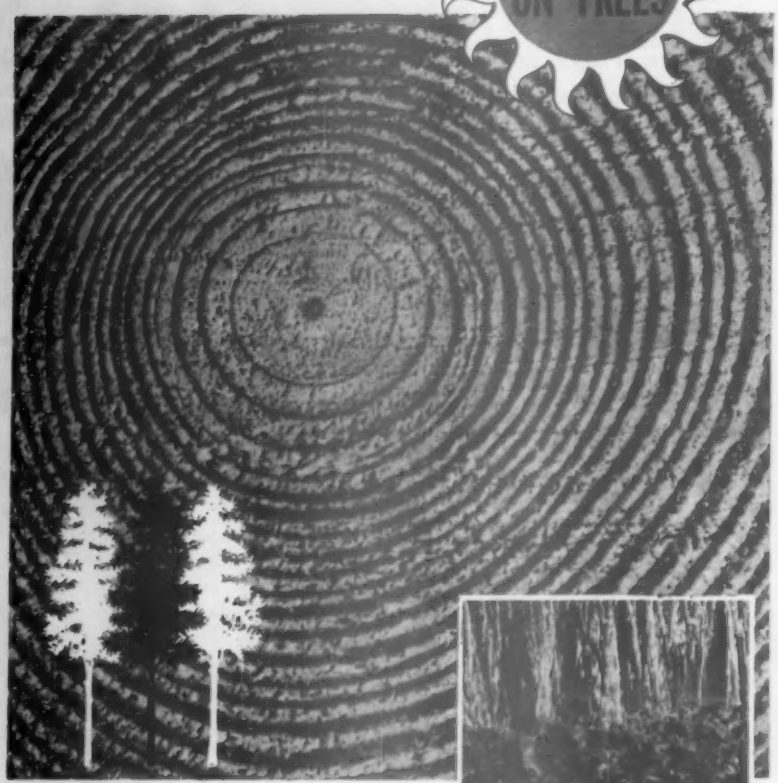
For more facts Circle 433 on Reader Service Card

LOUISIANA

where Industrial Climate GROWS ON TREES



Nowhere in the United States will you find a combination of weather, soils, rainfall, companies and *people* that yield a better harvest of forest products than in Louisiana. INSET picture shows a combination of wood and water of the sort that is making the state an up-and-coming producer of paper. Trees grow faster here, reach marketable size quicker. About 55 per cent of the state land area—16,128,900 acres—consists of forests. Managing these woodlands and producing the big variety of commercial and industrial materials that "grow on our trees" is an important job for thousands of Louisianians. These people and their forest products are still another reason why we say, "In Louisiana, *Climate* is a lot more than weather."

Every section of Louisiana has: SIZABLE COMMERCIAL CENTER/ABUNDANT FRESH WATER/ACCREDITED UNIVERSITY OR COLLEGES, GOOD SCHOOLS/TRADE SCHOOLS/GOOD TRANSPORTATION/LOW COST POWER AND FUELS

Write for new booklet, "Louisiana Invests in Industry." Other information available . . . each inquiry receives individualized handling.

LOUISIANA DEPARTMENT OF COMMERCE & INDUSTRY
SECOND FLOOR • BATON ROUGE 4, LOUISIANA

For more facts Circle 434 on Reader Service Card

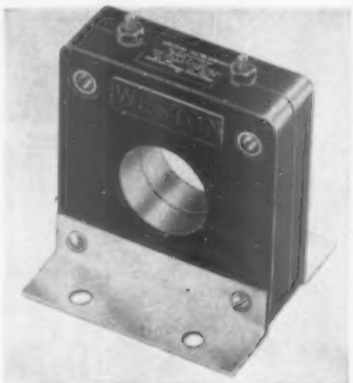
FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

118—Summer-winter ventilator recirculates heated air and exhausts hot air from single compact unit. Maintains uniform, controlled year-round temperature. Versatility is gained with specially designed dual-purpose damper. Capacities: 3000 to 23,000 cfm. *Genie-Air Products.*

119—Humidity-temperature cabinet is self-contained unit for cooling, heating, humidifying, dehumidifying, filtering air. Measures 41x34x27 in. Controls areas to 2500 sq. ft. automatically, accurately. For constant humidity rooms, etc. *American SF Products, Inc.*



120—Current transformer is so accurate it can be used with wattmeters or ammeters. Encased in plastic, mounts with bolts or right-angle brackets. Uses stud terminals. Operates at 25 to 800 cycles. Two models in 100:5 to 400:5, or 500:5 to 1500:5 ratios. *Daystrom, Inc.*

Turn the page

Roof of the University of Oklahoma drill hall was restored quickly and economically with 3R Aluminum Coating, a product of Colonial Refining & Chemical Co., Cleveland, Ohio.

See what 3R Aluminum Roof Coating did for a drill hall

Consider the University of Oklahoma's huge drill hall —big roof, big upkeep, you might say. Not any more. School maintenance officials wisely ordered a weatherproof, economical application of 3R Aluminum Roof Coating, made with ALCOA® Pigments.

Today, both appearance and performance of the roof are vastly improved. Leaks and cracks have been sealed—and an old, dark surface has been transformed with bright, uniform aluminum.

A good aluminum coating like 3R combines brilliant ALCOA Pigments in a tough asphalt-asbestos base. Maintenance experts know that one coat seals any surface—metal, brick, masonry, composition. The aluminum particles form a metallic shield that turns back 70 per cent of the sun's heat, protects the vital oils, keeps the coating pliant and waterproof in all seasons.

Applied with ordinary roofing brush or special spray equipment, aluminum coatings come ready mixed . . . require no thinning or heating. Look at your plant roof today. Is it up to your company's standards? A fibrated aluminum coating will restore like-new appearance, weatherproof for years.

ALCOA does not make aluminum roof coatings, but we'll be happy to refer you to reputable manufacturers who do. For our booklets, please send the coupon.

For exciting drama watch "Alcoa Presents" every Tuesday evening—ABC-TV

ALCOA ALUMINUM

PIGMENTS, PASTES & POWDERS

Aluminum Company of America
1750-C Alcoa Building, Pittsburgh 19, Pa.

Please send your free booklets:

- ☐ *Painting With Aluminum*
- ☐ *Aluminum Roof Coatings Make Time Stand Still*

Name_____

Company_____

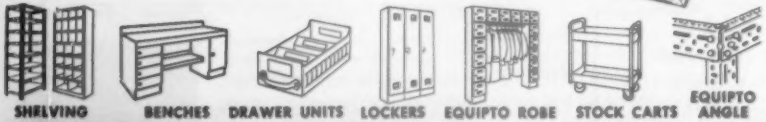
Address_____

City_____ Zone____ State_____

"The more you load an Equipto shelf the tighter it grips all by itself!"
EQUIPTO
IRON-GRIP
STEEL SHELVING
with the exclusive stud

No nuts, bolts or tools needed when adjusting Equipto Iron-Grip Shelving. Exclusive steel stud permits 60% faster shelf adjustment on 1½" centers. The more you load it, the tighter it grips, yet shelf may be moved easily. You can vary arrangement of drawers, dividers, or shelves to suit changing storage needs. Four uprights per unit allow units to be moved without disturbing adjacent units.

Equipto Iron-Grip Shelving is immediately available from stock in all sizes, either open or closed, with or without dividers, bin fronts, drawers or label holders. Write today for complete reference manual No. 485; also free booklet "HOW TO SOLVE YOUR STORAGE



Equipto
812 Prairie Avenue
Aurora, Illinois

FACTORY/EQUIPMENT NEWS

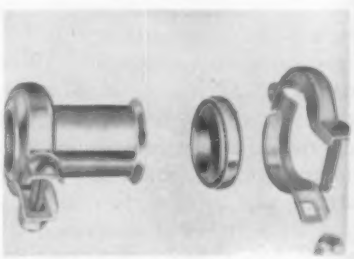
Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

121—Corrosive fume ventilator has critical parts made of plastic for long, trouble-free service. Fan's upblast blows high into air, minimizing corrosion fallout on nearby buildings. In ten inlet sizes, from 6 to 30 in., direct or V-belt drive. *Heil Process Equipment Corp.*

122—Electric arc gun makes holes and rivets, or stud, spot, tack, or button welds. No need to use electrode, or helmet. Hollow nozzle eliminates flash. Penetrates ¼-in. metal on single downward thrust. Uses a-c or d-c power. Portable, safe, low cost. *Beeco Mfg. Corp.*

123—Strip chart recorder line, rectilinear type, provides simultaneous recording of 2 to 6 variables on single chart in combinations of various movements. Sensitive to 250 ua. for d-c, accurate to ±1%. Moving coil and dynamometer movements. Ink, inkless. *Curtiss-Wright Corp.*



124—Pipe coupling joins ends without cutting or threading pipe. Uses improved gasket to assure uniform pressure against pipe and sleeve. No extrusion of gasket. In ⅜- to 4-in. pipe sizes, 2- to 36-in. lengths. Fastens with one nut and bolt on each end. *Aeroquip Corp.*

Turn the page

"The FT20 has more power, better stability and is much easier to maneuver,"

says Bill Spellings, lift truck operator at Chromcraft Corporation, St. Louis.

It's easy to understand why any operator would like these advantages. But let's see how they apply at Chromcraft Corporation specifically:

"More power at the drive wheels"

Production at Chromcraft is on two levels, and lift trucks must negotiate a ramp between them. Here the Allis-Chalmers FT20 is outstanding. It can come to a full stop going up the grade and start again easily with a capacity load. (Actually, that grade could be increased to 40 percent and the FT20 would still go up because it has the most power in the 2,000-lb truck class.)

"Better stability"

To reach some areas in the plant, it is necessary to carry the load high in order to clear machines and material. This stresses the importance of stability . . . again makes the FT20 first choice for the job, because of its low center of gravity and good weight distribution.

"Much easier to maneuver"

Always important, but especially so at Chromcraft. The loading dock is narrow and busy, and trucks must maneuver inside box cars. The FT20, with tight turning radius and easy steering ("I could turn it with one finger"), can pick its way in, around, and through areas where even smaller, less powerful machines cannot follow.

No engine overhaul in more than 18,000 hours

Chromcraft Corporation is one of the world's largest manufacturers of commercial and dinette furniture. Included in its fleet of lift trucks are two 2,000-lb Allis-Chalmers FT20's and three FT40's. Not one of the Allis-Chalmers machines has required an engine overhaul, although the oldest has logged more than 18,000 hours in 4½ years.

These Allis-Chalmers advantages can make a dollar-saving difference in your plant. Why not look into it? See your Allis-Chalmers dealer, or write for full information. Allis-Chalmers, Milwaukee 1, Wisconsin.

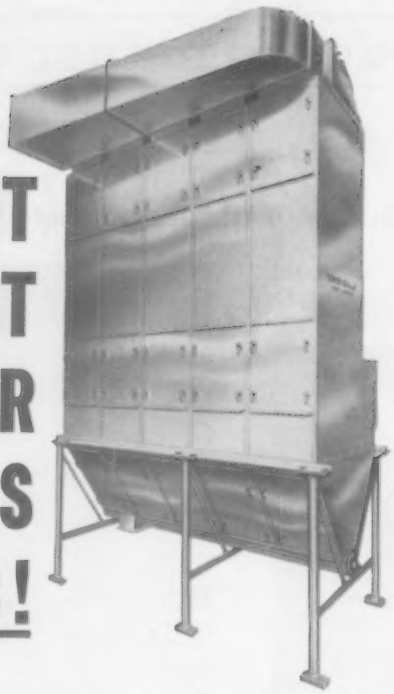
BH-147

ALLIS-CHALMERS

POWER FOR A GROWING WORLD

For more facts Circle 437 on Reader Service Card

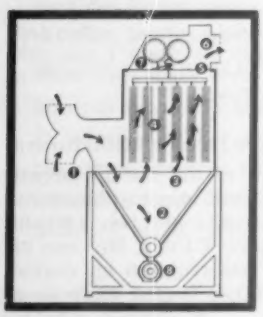
NEW TORIT DUST COLLECTOR IS AUTOMATIC!



Save real dollars with the benefits from this *automatic* dust collector. No more interruptions on production lines! Maintenance problems are practically eliminated. This all new continuously cycling TORIT dust collector *automatically* cleans your air and *automatically* shakes its own filters and blows them clean with reverse air flow. Collected material is emptied *automatically*.

OTHER EXCLUSIVE TORIT BENEFITS

- automatic filter-shaker mechanism is simple, maintenance-free
- different dusts may be collected separately
- highest air-to-cloth ratios (from 5 to 25:1) and longer filter life
- only ¾ H.P. required for fully automatic operation
- polished ¼" aluminum construction for minimum floor loading
- modular design—5′ wide x 4′-8″ long (for two sections) x 15′-6″ high—saves space, lends ease and versatility to installation. Use up to 12 modular sections for each application! No limit to CFM capacity!



AUTOMATIC AND EFFICIENT, the filtering cycle of each TORIT section is self-timing. A separate blower on the clean air side keeps collector under suction. Then, (1) dust-laden air is taken into manifold; (2) coarse dust drops out; (3) fine dust is carried to filtering sections; (4) filter tubes catch dust on inside surfaces; (5) clean air emerges from filters; (6) to suction fan and clean air discharge outlet. (7) *Automatic* shaking and reverse air filter cleaning mechanism. (8) Conveyor *automatically* removes and discharges accumulated dust.

Have a cleaner plant, better morale and high productivity with lowest maintenance costs. Special design services are available based on your individual requirements. Write today for literature.

TORIT MANUFACTURING COMPANY

Automatic Collector Division, 1133 Rankin St., St. Paul 16, Minn., Dept. 334

For more facts Circle 438 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 102

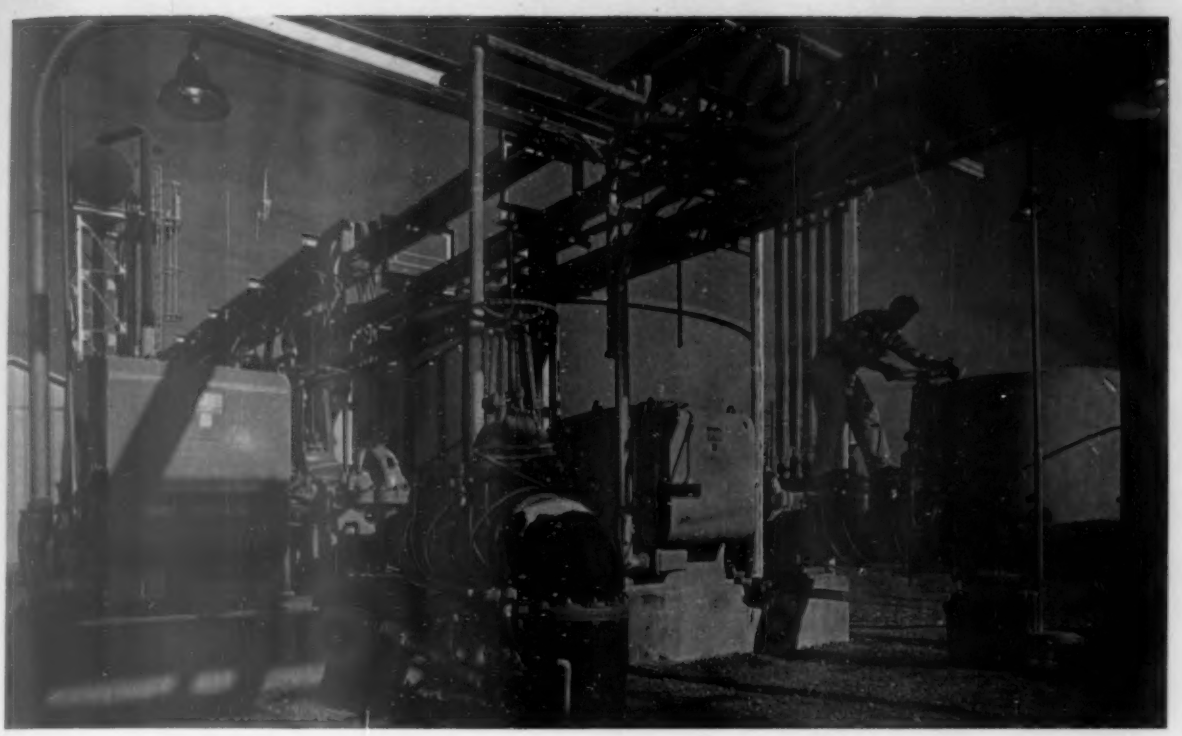
For more about these items, circle item numbers on Reader Service Card next to back cover.

125—Aluminum jacket to protect insulated lines, is pre-cut and pre-rolled for simple installation by one man. Crimping along one edge of Loc-Jac forms watertight seal with opposing edge. Each section interlocks with adjoining one to form continuous seal. *Premetco.*

126—Curtain of Light photoelectric system protects worker from getting caught in machine's dangerous area. When person enters danger area and breaks 7, 12 or 17 in. wide light beam, machine automatically stops. Not affected by ambient light. *Clark Controller Co.*

127—A-c/d-c inert-gas welders come in 200- and 300-amp. models. Permit welding with 1-amp. current. Switch or plug-in controls convert units to manual, automatic, TIG, inert-gas or gas-shielded-arc consumable electrode welding. Built-in inert-gas facilities. *Hobart Bros. Co.*

Turn the page



For Corrosion Protection In Depth ... *Call The* TRUSCON MAN!

Wherever plant and equipment are subject to critical acid, alkali or solvent exposures, high humidity, severe weathering, fumes and gases – or any combination of these–your first step should be to call the Truscon man.

Truscon will provide you with guidance in proper surface preparation, coating application, and inspection. Truscon will also present you with a detailed, written specification on protection of steel, iron, aluminum, concrete and other surfaces–interior and exterior.

Truscon, with a background of over fifty years in successful corrosion control, makes its services available to plant management, engineers and contractors for purposes of plant survey and specification of protective coating systems.

For a detailed description of the principal Truscon protective systems, and how they serve you, mail the coupon below for your copy of Truscon Corrosion Control Bulletin 9111. And, take advantage of a corrosion control specialist's services. Call the Truscon man!

FREE!

Truscon Corrosion Control Bulletin 9111 . . . yours without obligation. Mail coupon now.

TRUSCON Laboratories

DIVISION OF DEVOE & RAYNOLDS COMPANY, INC.

TRUSCON LABORATORIES,
1750 Caniff, Detroit 11, Michigan

☐ Send Truscon bulletin 9111 ☐ Send the Truscon man

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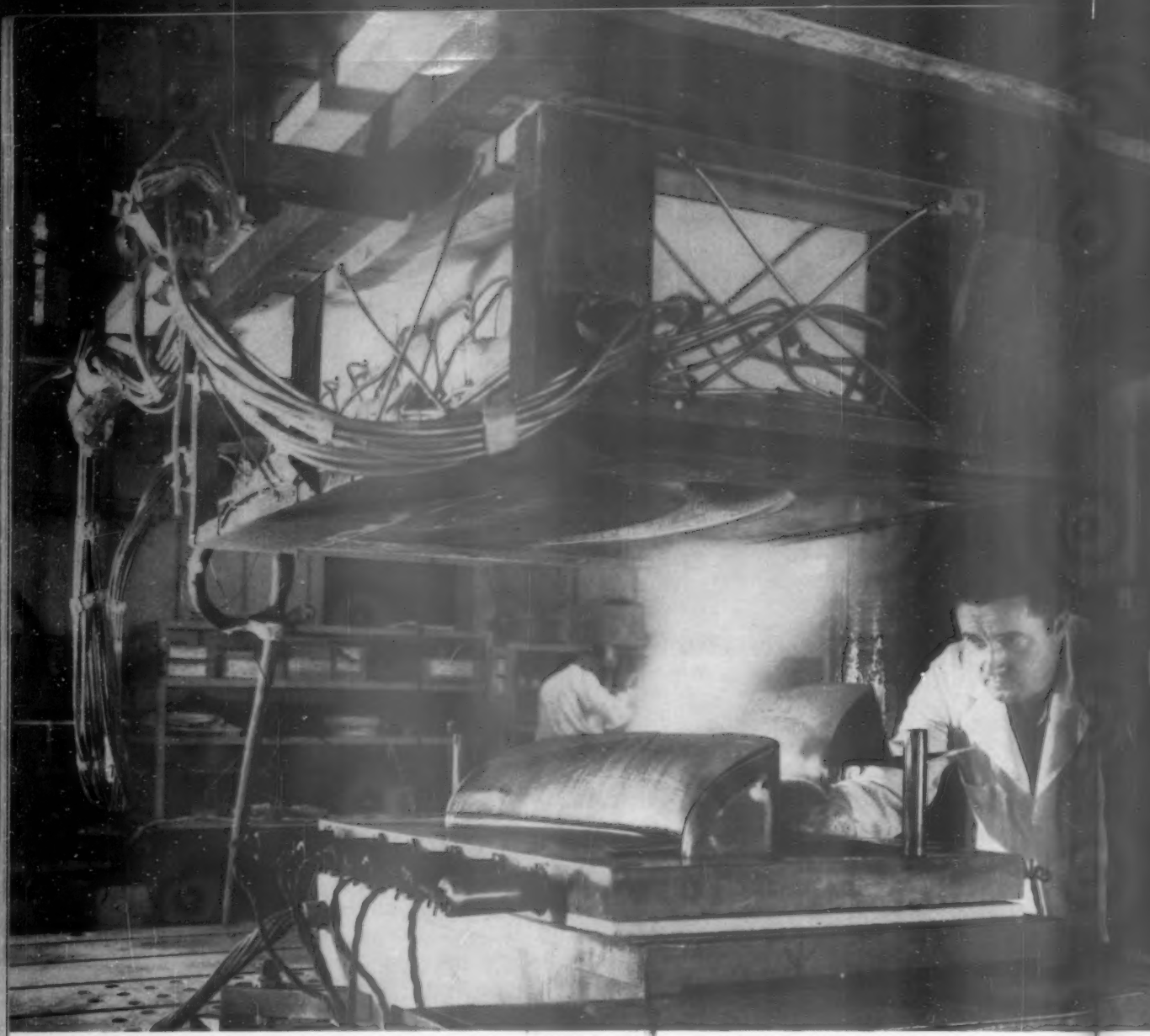
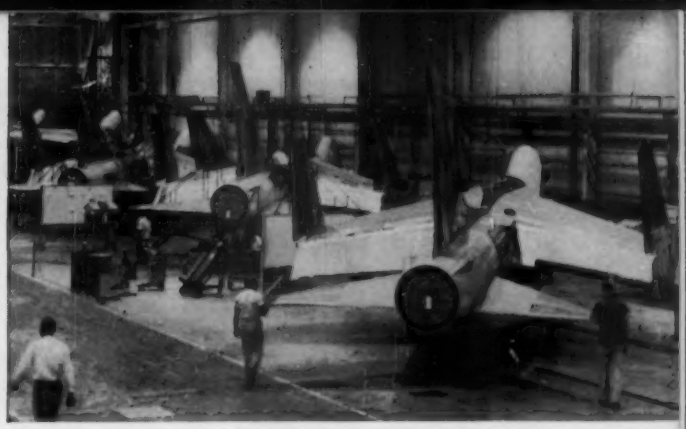


Gulf Harmony® oil has the extra stability press operation at Chance Vought...

Chance Vought Corporation, Dallas, Texas, developed a unique production technique to speed production of jet fighters. It's a 1000-ton press with electrically heated dies that permits the forming and stress-relieving of a titanium part in one operation.

However, this advanced technique created several problems. One, according to Doy Stanley, General Foreman, Facilities, was the heavier burden placed on operating parts of the press. When forming and stress-relieving were combined in one operation, high temperatures and pressures had to be applied for long periods of time. Under these conditions, maintenance of the press is very important. According to Mr. Stanley, "We've always stressed efficiency in our operation. And downtime is, as you might say, doubly inefficient."

Proper lubrication of hydraulic mechanisms and other press parts subjected to elevated temperatures and pressures is a must to keep production right on schedule. Says Mr. Stanley: "We have never had any



F8U Navy fighters near the end of the assembly line. Aircraft's leading edges use titanium part that has been formed and stress-relieved in one operation.

Doy Stanley, left, discusses hydraulic oil applications with Grover Garrison, Gulf Sales Engineer. Hamilton Press shown in background is one of various presses at Chance Vought that use Gulf Harmony oil.

On this 1000-ton press, simultaneous forming and stress relieving of titanium takes place at 1000 deg. F. Quality Gulf Harmony oil protects the vital hydraulic system.

needed for high temperature
GULF MAKES THINGS RUN BETTER!

downtime, or any trouble at all that can be attributed to lubrication. This excellent record is due mainly to the fact we use a high quality hydraulic oil that won't break down under heat."

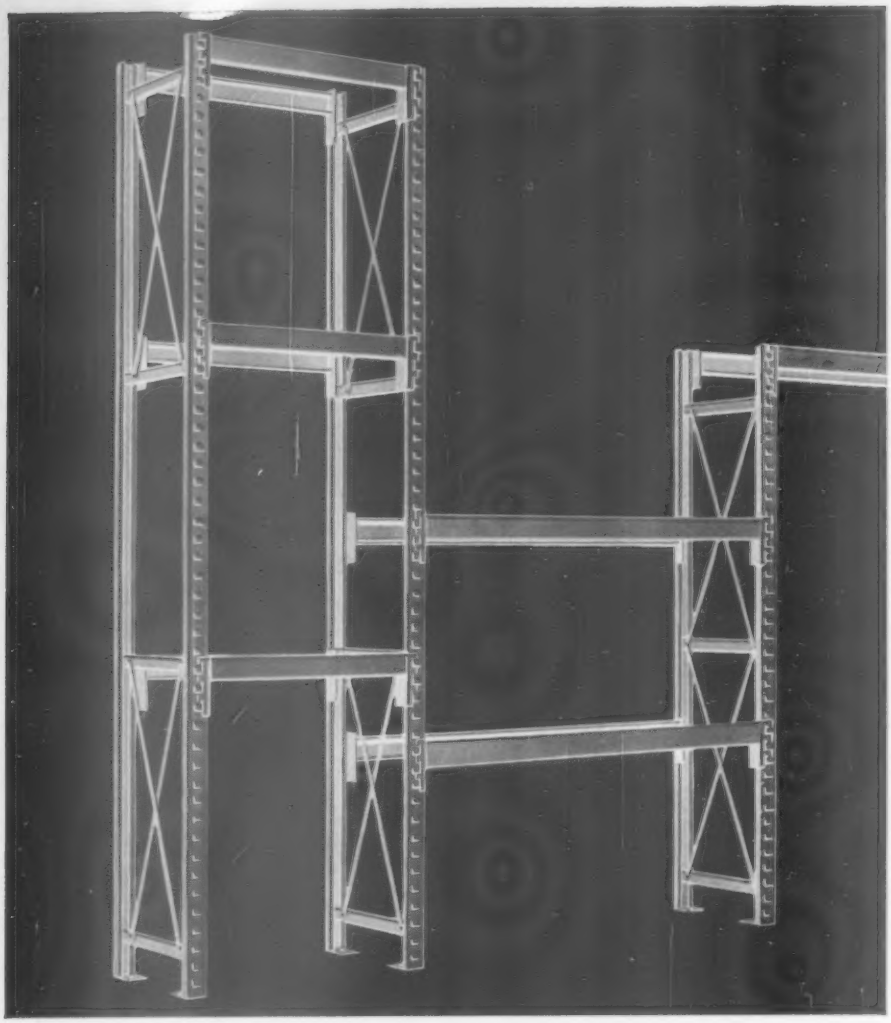
That "high quality hydraulic oil" Mr. Stanley refers to is Gulf Harmony. It not only withstands heat, but resists oxidation, which improves service life and prevents sludge formation. Also, a corrosion inhibitor guards against rust, and an anti-foaming additive assures a smooth transfer of power.

If you have problems involving hydraulic fluids, or any petroleum product application, may we have the opportunity to prove to you that Gulf makes things run better! Call your nearest Gulf office, or write us for additional information.

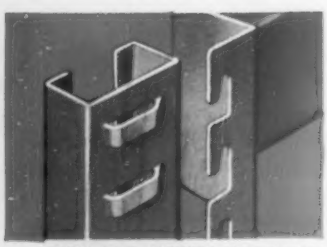
GULF OIL CORPORATION
Dept. DM, Gulf Building
Houston 2, Texas

GULF

For more facts Circle 440 on Reader Service Card



Best buy in the industry—Meet the PALMER-SHILE series 75



. . . **PLUS "SAFETY WHITE!"** An innovation in the storage system industry is Palmer-Shile's Safety White! Exclusive with the "Series 75," Safety White rack finish gives you another big plus: total rack visibility even in dimly lit areas . . . as well as a vastly improved appearance of your storage area.

The combination of strength, adaptability and cost that you'll find in the Palmer-Shile "Series 75" makes this new and highly versatile storage rack today's best buy in the materials handling industry. **CONSIDER STRENGTH:** There's *no metal removal* in the construction of uprights for "Series 75." Uprights are constructed as complete, integral units. And they are *completely* sway braced. The many shelf designs available assure optimum safe loading conditions. **CONSIDER ADJUSTABILITY:** "Series 75" adjusts on 3" centers from top to bottom without loss of adjustability at bracing points. What's more, erection is greatly reduced as there are no third-piece connectors. Cross members lock instantly and positively to the uprights in this two-piece system. **CONSIDER PRICE:** This custom rack system with its unique strength, its total adjustability—is priced *competitively or under* less perfect racks. *Write today for the full story on "Series 75."*

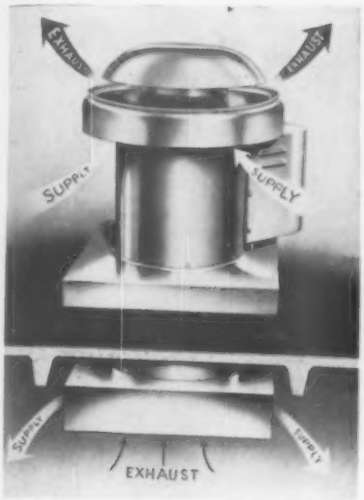
PS **PALMER-SHILE**

SERVING THE MATERIALS HANDLING NEEDS OF THE NATION

16000 FULLERTON, DETROIT 27, MICHIGAN

For more facts Circle 441 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.



128—Twinalator supplies and exhausts air simultaneously. Single, compact unit needs only one opening; has one motor, drive, and starter. Draws clean air from above roof level. For use in closed or semi-closed areas, to 200 F., and with gases, fumes. *Clarage Fan Co.*

129—Charger-battery combination produces instant starting current for standby gas or diesel engines. Charging is done from power line, not by emergency generator. Battery's low water needs and low maintenance of charger make it ideal for remote areas. *Electric Autolite Co.*

130—Mechanical speed drive is said to be first such unit designed to customer needs. Vari-Master line comes in 3 sizes, ranges from 1 to 10 hp., and up to 8:1 ratio of speed variation. With manual, electric remote, or pneumatic automatic controls. *Western Gear Corp.*

Turn the page

Nutting shows you "HOW"...

the widest choice of floor trucks in the world can cut your costs!

For regular or "special" design floor trucks it pays to talk to Nutting *first*. Here's why: no other company makes more models, sizes or combinations of equipment than Nutting. Many times items which you may find listed as "specials" with other makes are regular equipment in Nutting's complete line. As a result you get "custom built" trucks at production line prices. You not only get overall lower prices; you also get the benefit of 70 years of experience, design "know-how" and modern manufacturing skills. To save valuable hours of your time and get the right equipment for your plant, talk to a Nutting representative *first*, for all your floor truck needs!

Nutting makes over 1000 products, here are just 16 of them

For appliances and finished products

Wagon trucks up to 10,000 lbs. capacity

All types of dollies for boxes & cases

For sub-floor & overhead drag lines

Trailers — up to 7,000 lbs. capacity

CASTERS — all types

WHEELS — demountable rubber tired, solid rubber, plastic & metal

Shelf and tray trucks

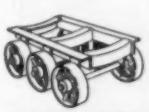
2 wheelers for freight

Steel & aluminum frames for cases & cartons

Drag line trucks & trailers for palletless handling

Non-tilt platforms — Wood & steel frames

Shelf trucks for sub-assemblies


Dollies for cylindrical & odd shaped items

Triform & box trucks for packages & bundles

"Auto-Load" barrel & drum trucks

Tilt style platforms — Wood & steel frames

Dollar for dollar, feature for feature Nutting is your best floor truck buy. Write for your free copy of new Junior Catalog 59G.

Nutting

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"Call FOSTER for Rail"...Get Relayers PLUS

Installing or expanding in-plant trackage? Foster will deliver Quality Relaying Rail at lower cost . . . "plus" all necessary new track accessories, switch material—even the track tools to do the job. To help select the materials best suited to your job, call the Foster Track Specialist.

You will save on freight from Foster's nationwide warehouses, all of which stock all sections of relaying rail "plus" new rail for crane runways and specialized applications.

Another "plus": Foster's Track Inspection Kit, which illustrates all the elements needed for an efficient industrial siding. It's a real help for proper track maintenance.

Write **L. B. FOSTER CO.** for free Track Kit FA-3, Pittsburgh 30, New York 7, Chicago 4, Houston 2, Los Angeles 5, Atlanta 8, Cleveland 35.

Faster From Foster

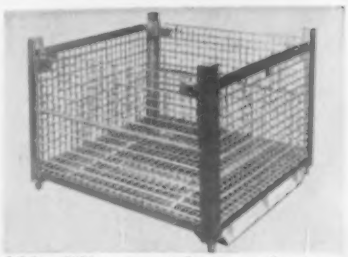
Pipe • Rental Steel-Sheet Piling • Pipe Pile • Rail

For more facts Circle 443 on Reader Service Card

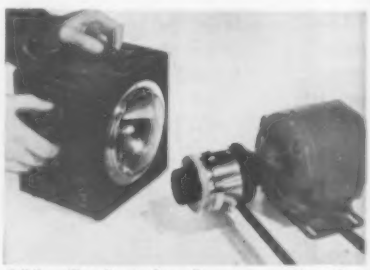
FACTORY/EQUIPMENT NEWS

Begins on page 102

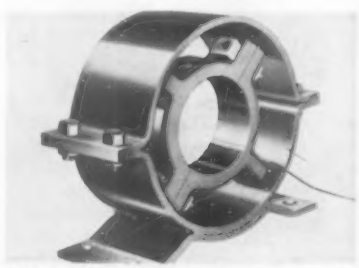
For more about these items, circle item numbers on Reader Service Card next to back cover.



131—Wire container and storage rack holds 6000 lb., stacks to save floor space, and is self-cleaning. Can be picked up easily by fork trucks and cranes, then moved by rail or truck. Drop sides optional. Sizes 48x53x38 and 42x43x38 in. *Springport Steel Products Co.*

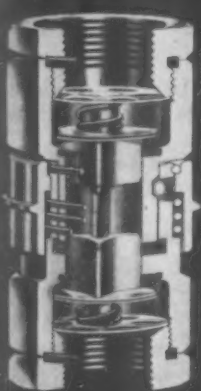


132—Pocket-size dynamometer that measures motor torque to 22 in.-lb. in either direction with ±½% accuracy. Slips onto shaft; secured by hand-operated collet. V-belt pulley adjusts from 2 to 3½ in. diameter. Adaptor for direct drive to hubs, spokes, gears, etc. *Micro Pump Corp.*



133—Pipe guide, for expansion joints, has spider that moves axially in segmented cylinder (photo) for accurate alignment. For ¾- to 24-in. pipe. Related line of roller-pipe supports comes in ¾- to 14-in. sizes, larger on special order. Both units are made of steel. *Flexonics Corp.*

Turn the page



Provided with valves to give two-way or one-way automatic line shut off.

Built to handle high pressure hydraulic and pneumatic systems

Snap-Tite *valved* couplings stop flow instantly"

Snap-Tite provides instant shut-off wherever fluid coupling is needed.

Snap-Tite *valved* couplings connect and disconnect quickly and fully—they automatically open line flow when connected; positively seal your line when disconnected—with no "ifs," no chance for human error.

Snap-Tite couplings are available in sizes from ¼" to 6" ID, in steel, brass, aluminum, 303 ss and 316 ss. Sizes from 6" to 10" ID are available on special order. For more information, write for Snap-Tite catalog #58. Snap-Tite representatives are located in all principal cities.

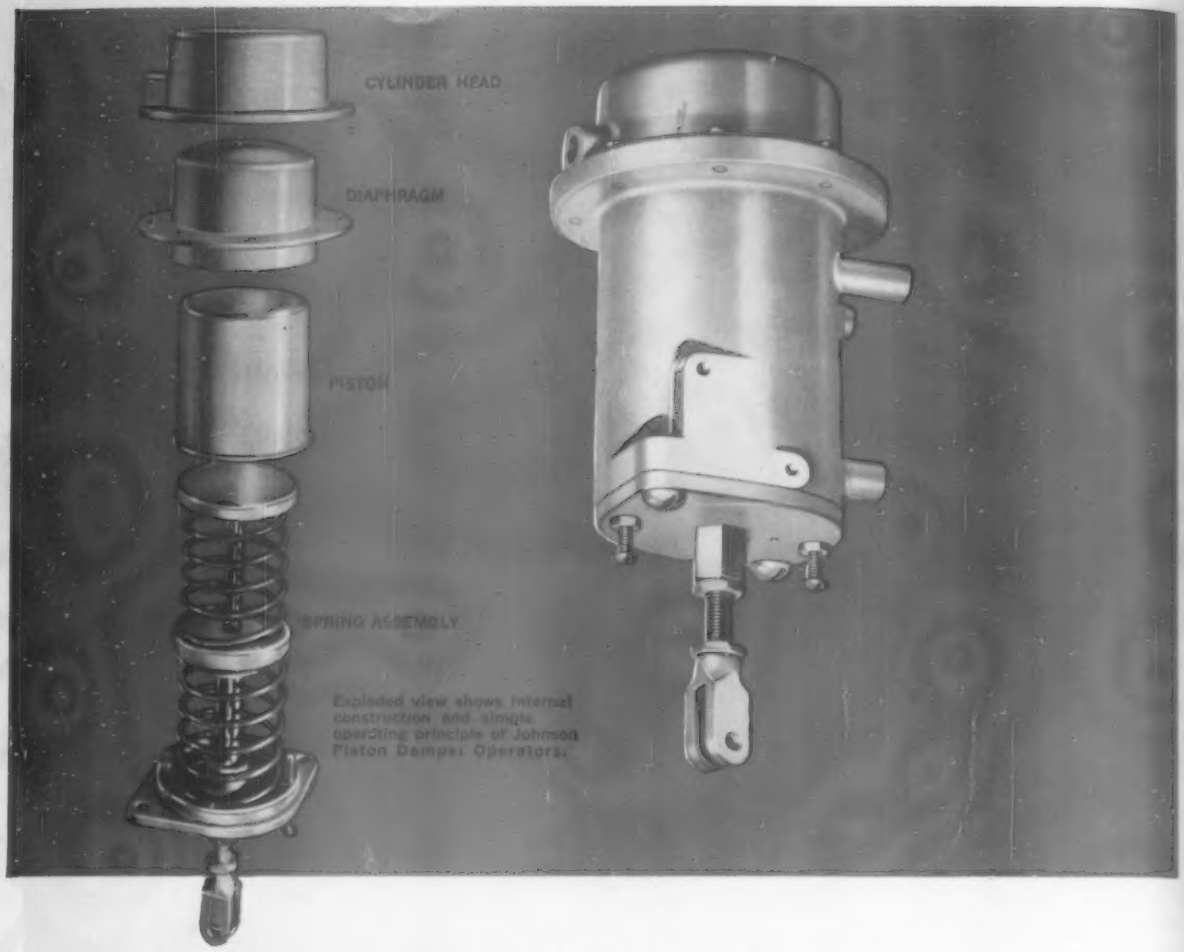
SNAP-TITE COUPLINGS CAN HANDLE ALMOST ANYTHING THAT FLOWS

☆ Snap-tite

ST-58-01

UNION CITY, PA.

For more facts Circle 444 on Reader Service Card


CYLINDER HEAD
DIAPHRAGM
PISTON
SPRING ASSEMBLY
Exploded view shows internal construction and simple operating principle of Johnson Piston Damper Operators.

JOHNSON piston type damper operator

Simplified Design Assures Accurate, Trouble-Free Damper Operation

- Long stroke design for maximum power . . . allows damper to be operated *directly* from piston rod for accurate, positive positioning. No linkage or levers to lessen power. Easily outperforms conventional operators.
- Rugged, trouble-free construction. Spring and diaphragm are fully enclosed. Powered by age- and heat-resistant molded rubber or molded silicone diaphragms.
- Adjustable stops permit limiting stroke in either direction.
- Can be mounted in any position on damper frame, wall, or duct.
- Attractive die-cast, non-corrosive body.
- Available in choice of sizes and in single and two-stage models. Also available with Pilot Positioners for extreme accuracy of re-positioning.

For complete information, write for Bulletin D-251. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

JOHNSON CONTROL

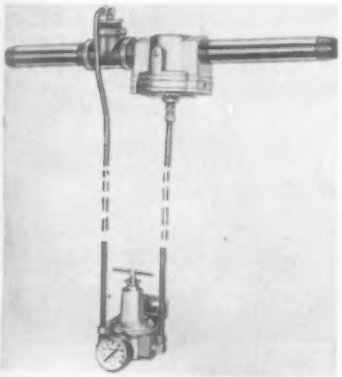
PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

For more about these items, circle item numbers on Reader Service Card next to back cover.

134—Bulb changer has long arm that telescopes to reach overhead "slim line" fluorescent fixtures for servicing. Crossarm at handle end grips with clips. Pressure then exerted on handle releases bulb from socket. For 14 or 18 ft. heights. *Parkraft Mfg. Co.*

135—Ultrasonic level indicator is direct-reading, compact system for measuring liquid levels in containers where moving parts and floats cannot be used. Transistorized Sonometer handles homogenous liquids in very low to very high temperatures. *Acoustica Associates, Inc.*



136—Air pressure regulator permits installing control portion in locked box or in another room for remote regulation of inaccessible air lines. In Pilot Controlled regulator column of air replaces adjusting screw and control spring of standard units. *Hannifin Co.*

Turn the page

Shepard Niles JOB-MATED Hoists

LOWER THE COST OF LIFTING YOUR LOADS

Shepard Niles Vapor-Proof Hoist

Each Shepard Niles **JOB-MATED** Hoist is supplied with the combination of components best suited to meet your exact on-the-job conditions. This care in our plant means reduced handling, production, and storage costs in yours . . . through increased efficiency, minimum maintenance costs and extra years of service with QUALITY equipment.

You can choose **JOB-MATED** Hoists in capacities from ¼-ton to 30 tons . . . with motor-driven or push-type trolleys . . . single or multiple speed controls (multiple speed provides from 5 to 17 control steps) . . . pushbutton, pendant rope, or lever controllers . . . floor or cab-operation . . . vapor-proof or explosion-proof construction.

Each **JOB-MATED** Hoist is tested under full load before shipment, and is guaranteed to perform as rated without overheating of motors, controllers, and brakes. You'll find it will pay to look into Shepard Niles **JOB-MATED** QUALITY Hoists for your load-lifting and moving operations. Write for descriptive bulletin and request a representative to call.

Member of Hoist Manufacturers Association, Inc.

America's Most Complete Line of Cranes and Hoists

SHEPARD NILES
CRANE AND HOIST CORPORATION

3364 Schuyler Ave., Montour Falls, N.Y.

For more facts Circle 446 on Reader Service Card

No. 7 in a series of washroom survey comments from "SBS soap counselors"

They asked us how to combat hard-to-remove soils!

George Y. Schombert

is the soap counselor who has helped many plants find economical solutions to skin hygiene problems. Here's his case history report of conditions at an Eastern steel mill:

"Workers in this steel mill come in contact with many hard-to-remove greases, tars, chemicals and paints that are potential irritants. In the Coke By-Products Plant, for instance, a too high percentage of workmen showed signs of rough, cracked hands due to the use of harsh solvents as a hand cleaner. Plant efficiency suffered; management asked us for a solution.

"We obliged by suggesting *SBS-30 Waterless Skin Cleanser.* After telling them how completely SBS-30 has cleared up skin hygiene problems in other plants, we showed them how easily they could set up waterless washstations . . . anywhere in the mill where they have hard-to-remove soil problems. We pointed out other SBS-30 advantages: elimination of washing with harmful solvents, fewer trips to washrooms . . . happier employees working more efficiently!"

Money-saving suggestions like this *begin* with OPERATION PINPOINT–a thought-provoking presentation filled with facts about skin hygiene and washroom maintenance. The SBS soap counselor serving your area can pinpoint the right soap to do every skin cleansing job best and at lowest cost in your plant. Let him show you OPERATION PINPOINT . . . just call your nearest SBS office, collect.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J.
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

137—Floor spray gun applies a smooth, even layer (from 1/16 in. to needed thickness) of catalyzed materials mixed with fillers, such as silica and aluminum oxide. Application costs about 5¢ per sq. ft. against 20¢ for troweling. Has mobile 10-gal. tank. *Carboline Co.*

138—Indicating controller, potentiometer type, achieves infinite resolution by eliminating slidewire. Modular construction permits interchanging subassemblies. Easy-to-service draw-out chassis. Accuracy is ¼%, pen travels at 1, 5 or 15 sec. *Minneapolis Regulator Co.*

139—Hydraulic semi-trailer can be lowered to ground, leveled with any loading dock, or tilted backward, forward or sideways. Power is supplied by tractor or from self-contained power kit. Both ends raise to 52 in. This 18-ft. unit has 20,000 lb. capacity. *Hi-Lo Truck Corp.*

Turn to page 134

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

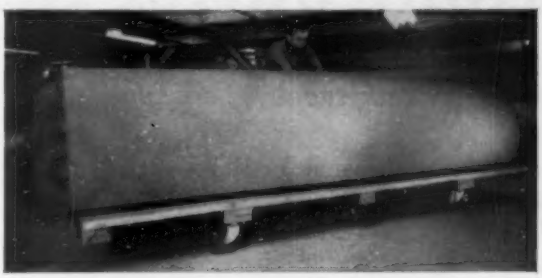
Grumman "Gulfstream" Assembled on Bassick Casters

Eight-inch Bassick Series "HA" casters insure easy movement of this rugged stand (right) used for wing assembly of the Grumman "Gulfstream" passenger plane. It's only one of the Bassick-equipped stands used in building the Gulfstream.

Swivel locks on casters and foot-operated Bassick position locks (small photo) fix the stand in position while work progresses. Heavy-duty "HA" swivel casters feature precision unit-type main load and thrust bearings. They can take the abuse of heavy loads under most grueling conditions and continue to combine easy swiveling, smooth rolling, and maintenance economy.

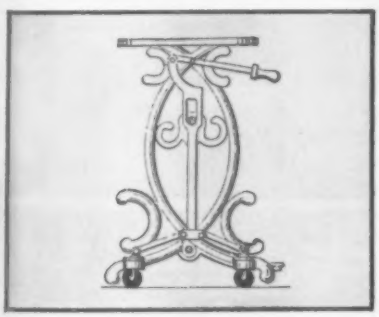
Fine paper gets gentle handling at Kodak

Probably nowhere in the world is paper given such careful attention as at Kodak Park Works of Eastman Kodak Company, Rochester, N. Y., where fine photographic papers are turned out. A man-sized handling job involving a heavy roll of paper is made easy by this special paper-handling dolly. It's equipped with 4" Bassick "77" casters, featuring a rugged one-piece horn and "Diamond Arrow" two-level ball-bearing swivel.



Here's a "dollyful" of easy walking!

At Magee Carpet Company, Bloomsburg, Pa., this carpeting, more than 1000 pounds of it, rolls over floors as smoothly as it will later lie on them . . . thanks to Bassick "H99" casters. "H99's" are the "best-sellers" among high-quality industrial truck casters—bar none. Oversized bearings, heavy frames fit them for roughest usage.



What's new under the sun?

Here's an 1875 illustration of a sewing machine, complete with casters and "position locks."

Today, Bassick's ball-bearing swivel construction and advanced wheel designs make possible the carrying of loads up to thousands of pounds per caster and with far greater protection to floors than our forefathers ever dreamed of!

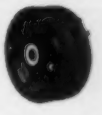
The high cost of maintenance

. . . continues to amaze us. Did you know that labor charges and lost-time charges for caster replacement *can frequently exceed the cost of the new caster installed?*

It's a fact. And it's a good reason why you should *insist on Bassick casters*—the highest quality available. You'll save in the long run.

Grooved wheels simplify production

They run equally well on floors or simply constructed inverted angle-iron tracks. Tracks permit precise control of motion and Bassick position locks can hold truck or cart rigidly at any location.



See your local distributor. He offers a wide selection of Bassick casters . . . many types in stock for immediate delivery. 1.13

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Symbol of SW Excellence

Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

Now! A new rugged line of versatile foot switches from Cutler-Hammer

Smartly styled . . . four types . . . designed to be used many different ways

Now you can get the same high quality in foot switches you find in Cutler-Hammer motor starters.

Our new foot switches are designed to be stepped on, kneed, elbowed, palmed or whatever method you can think of to use them. Heavy gauge metal and rugged construction will keep these switches operating long after others have failed.

You get versatility, too. The heavy duty, side treadle switch has three interchangeable operating arrangements that can be made easily in the field by just changing the position of a nylon cam, and all are styled alike to give you uniformity in appearance.

Be sure to get full details from your Cutler-Hammer distributor and send for Pub. LO-91-E211.

What's new at Cutler-Hammer?
We've geared up for the great growth of technology coming in this decade . . . with new, better products like the foot switches, new engineering talent, new plant facilities. If you're planning ahead, let's get together. Maybe we could help you with your electrical control and automation plans. Get in touch with the Cutler-Hammer Sales Office nearest you.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

HEAVY DUTY SIDE TREADLE OPERATED FOOT SWITCH

Most versatile foot switch you've ever seen. Just by changing the position of a nylon cam, you can change the operation of the switch on the job. Comes with four nameplates (Start, Stop, Forward and Reverse). Pick the two you want, toss the other two.

HEAVY DUTY TREADLE SWITCH WITH FOOT LOCK Non-slip tread helps keep operator's foot from slipping. Available with several types of guards. Locks when depressed, opens when red release is touched.

HEAVY DUTY PALM-TYPE SWITCH Big orange surface easy to see. Rated for 600 volts maximum. Neoprene gasket stays flexible, resists effects of oil.

STANDARD DUTY TREADLE-OPERATED FOOT SWITCH Use it for a knee operation. Has a rating of 600 volts maximum. Three mounting bosses permit mounting on uneven surfaces without rocking.

WEDGMOUNT LEVELING MACHINERY MOUNTS

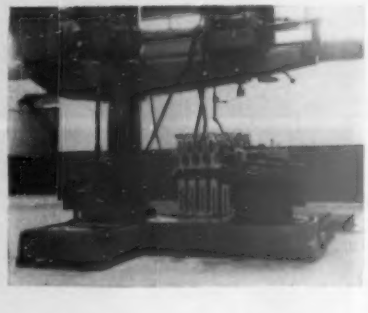
You can now effectively dampen and isolate the vibration, shock and noise of any machine with Wedgmount machinery mounts.

Wedgmounts are manufactured in a wide range of sizes and capacities so that it is possible to control the vibration of any type of machine tool — from punch press to grinder.

Wedgmounts are installed without bolts or cement and installation takes but a matter of minutes. Because of their opposing wedge construction, Wedgmounts are easily leveled by means of an adjusting bolt — no need for shimming.

Other models, retaining the leveling feature, are available to use where bolting to the floor is mandatory, or where it is desired to make the mount an integral part of the machine.

Write for full information about Wedgmount leveling machinery mounts.



* The photograph above is from an actual Wedgmount installation. It is one of eight 4" x 8" Type S Wedgmounts supporting a Cincinnati-Bickford 6 foot radial drill, shown at left.

Air-Loc® DIVISION

Clark, Cutler, McDermott Co.

105 WEST CENTRAL ST. • FRANKLIN, MASS.

For more facts Circle 450 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

140—Electric sign, operated from standard voltages, uses so little current it can be left on permanently. Requires no ballast. Fastens to surface—needs no protection. Green or white light. Undamaged by punctures. Guaranteed 5 years. *Sylvania Electric Products, Inc.*

141—Vibro-Shear is low-cost cutting and forming machine for sheet metal, steel plate. Cuts curved or corrugated sheets smoothly. Does circle, straight, free-hand, and louver cuttings, and shapes needing specific arcs. In ⅛- to 25/64-in. capacities. *Hedstrom Tool Co.*

142—Portable hydraulic press cuts cable, makes slings, eyes, chokers, splices right on job. No need to dismantle and carry cable to shop. Exerts 15 tons pressure, yet is easily operated by one man. Small model handles cable to ½ in.; large, ½ in. up. *Mark Naught, Inc.*

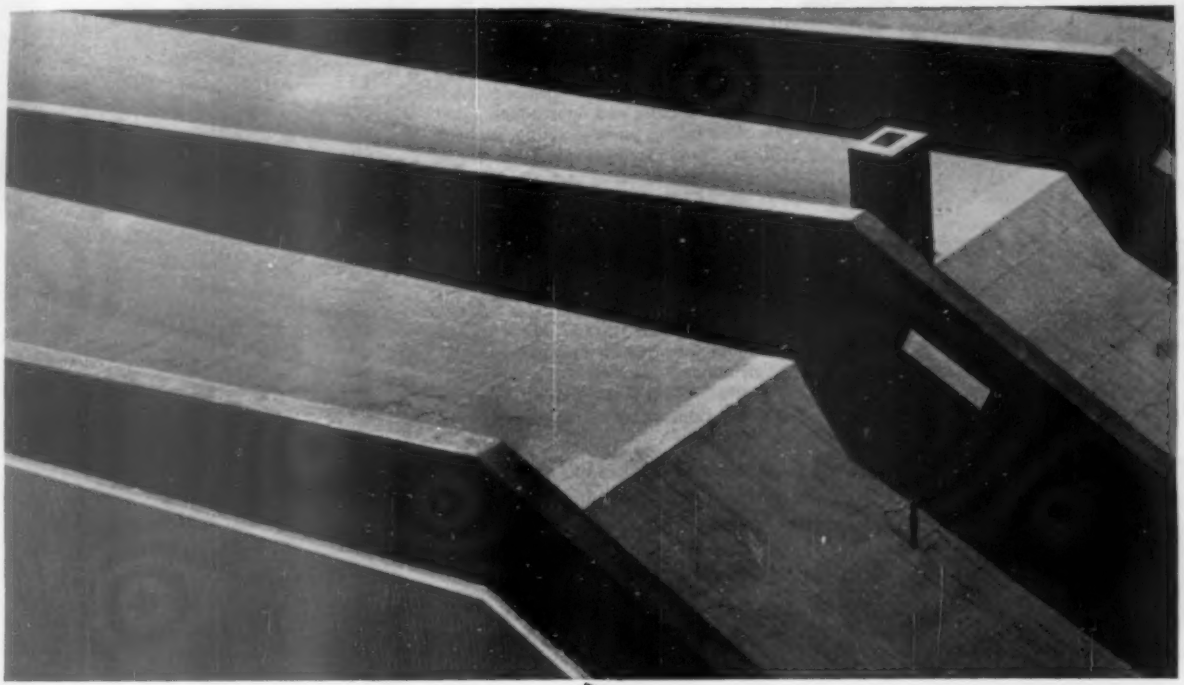
Turn the page

THERE'S A JOHNS-MANVILLE SPECIFICATION FOR EVERY ROOF INCLINE

J-M smooth surface asbestos built-up roofs

save on dead weight, pay off in longer roof life

AQUADAM®
SMOOTH SURFACE BUILT-UP ROOF — DEAD LEVEL TO ¼" PER FOOT



½" TO 6" PER FOOT — **FLEXSTONE®** SMOOTH SURFACE BUILT-UP ROOF

At left in the photograph above, you see an Aquadam Smooth Surface Built-Up Roof, which combines the bitumen *Aquadam* with J-M Asbestos Felts. Aquadam, especially developed for dead-level roofs, has the best features of coal tar pitch and of asphalt, without their weaknesses.

On your right in the photograph, the steeper incline requires a Flexstone Smooth Surface Built-Up Roof, which combines Standard 190 Asphalt with J-M Asbestos Felts. These felts contain a minimum of 85% asbestos fibre, each fibre as fine as silk, yet strong as steel. This high content of fibred stone means no gravel or slag is needed.

Both these J-M smooth-surface specifications make it possible to eliminate the weight of slag or gravel (from 300 to 400 lbs. per square) from the roof. And this saving in roof weight suggests possible economies in building construction. Flexstone and Aquadam roofs offer easy application . . . lower upkeep, easy inspection . . . and proven durability in years of service.

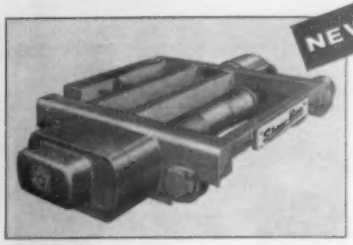
These are only two of the many roof specifications available to you. And if you're faced with an unusual situation on which you want advice, just call your local J-M Representative. For further details, write to Johns-Manville, Box 158, Dept. F-361, New York 16, N. Y. In Canada, address Port Credit, Ontario. Offices throughout the world. Cable address: Johnmanvil.

JOHNS-MANVILLE

JOHNS MANVILLE JM PRODUCTS

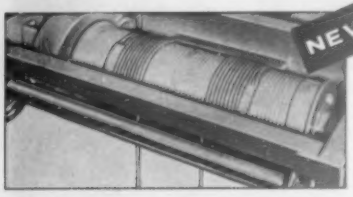
Something New In Cranes ...at no extra cost!

New standards of quality and modern low headroom design are established in these Series "D" Cranes. They are built for regular industrial service — *yet have many of the advantages priced into the most expensive cranes.*



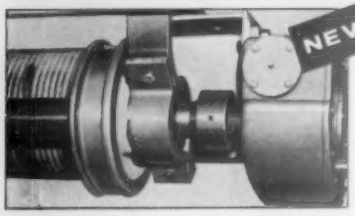
NEW **TROLLEY FRAME**

All steel, welded into a single unit and integrated with the hoisting machinery. Far stronger than the mounted monorail type of unit. Compact design provides high hook lift and close end approaches. Load and motor brakes positive acting; no back drift of hook. Trolleys available for a variety of speeds, lifts, and all standard currents.



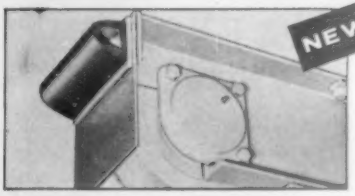
NEW **ROLLED STEEL DRUM**

A strong weldment — not a casting. Right and left hand deep-machined cable grooves provide true vertical lift at all times. No overlapping of cable on the winding drum. The drum and load sheaves have diameters at least 24 times the hoist rope diameter. Long cable life assured.



NEW **FLAME HARDENED WHEELS**

. . . on trolley *and* bridge are made of forged steel. All wheels are double flanged, with treads and flanges flame hardened to 550-600 Brinnel — nearly as hard as tool steel. Accurately machined to close tolerances, tapered bridge wheel treads assure easiest bridge movement. You can count on long wheel life.



NEW **RUBBER BUMPERS**

. . . tough, resilient. Take jolting impacts far better than wood — absorb shocks and take the strain off end trucks and bridge members. Other standard bridge features include rigid box section construction, heavy duty brake, motor and drive unit, and a checkered steel non-skid platform.

There's still more These Shaw-Box Series "D" Cranes are built in capacities from 3 to 25 tons. Models for floor and/or cab control. Spans to 80 feet. Pre-engineered components save you money and speed delivery. Write for catalog.

MANNING MAXWELL & MOORE INC. MM TRADE MARK

SHAW-BOX CRANES

A product of

MANNING, MAXWELL & MOORE, INC.

EOCI MEMBER

Shaw-Box Crane & Hoist Division • Muskegon, Michigan

In Canada: Manning, Maxwell & Moore of Canada, Ltd., Galt, Ontario

FACTORY / EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

143—Narrow aisle truck has universal clamp and independent arm action for palletless handling of loads of various widths. Aisle-Master's rubber-faced arms adjust from 12 to 56 in.; simplify high stacking, eliminate unnecessary repositioning. *Lewis-Shepard Products Inc.*

144—Automatic spray booth collects paint overspray on disposable curtain. Eliminates pumps, piping, water treatment, sewer connections, booth and stack cleaning. Dispo booth exhausts about 300 cfm. of air/sq. ft. of cloth area at 3-in. resistance pressure. *Binks Mfg. Co.*

145—Combustion indicator accurately senses changes in gas fuel supply (to 5 Btu.) and air/gas mixture (±.05%) in 5 sec. Continuous-reading device controls heat transfer rate in exacting time-temperature cycle installations. Detects flame changes. *Selas Corp. of America.*

Turn the page

LINK-BELT HELICAL GEAR SPEED REDUCERS

3-of-a-kind for versatility

GEARMOTOR

perfect choice for close quarters

Where inches count, here's your best choice for high-efficiency speed reduction. Simple gear trains and flange-connected motor combine for exceptional compactness. The flange connection eliminates additional coupling devices . . . assures positive, permanent motor alignment. Available in double, triple and quadruple reductions. Ask for book 2747.

MOTOGEAR

no delays in motor replacement

Motor switching takes just minutes with Link-Belt Motogears. They're designed for bracket-mounting, foot-type motors of *any enclosure, any make!* No need to drain oil. And no realignment problems—the rigid bracket automatically assures accurate positioning. Other features: oil-tight cast iron housing; hardened gears; straddle-mounted pinion that easily withstands shock, reversing or heavy loads. Available in double, triple and quadruple reductions. Ask for book 2747.

IN-LINE

mount the motor anywhere you want it

Your choice of drive arrangements is practically limitless with a Link-Belt In-Line. You can mount the motor anywhere . . . it needn't be direct-connected. Input and output shafts are on the same horizontal and vertical planes . . . offer maximum flexibility to meet layout and space requirements. In-Lines feature the simplest of gear arrangements . . . encased in sturdy, well-sealed, one-piece housings. Available in double, triple and quadruple reductions. Ask for book 2751.

ASK OUR ENGINEERS! Our experienced field engineers will help you with your application problems. With industry's *most complete* speed reducer line to work with, their recommendations are unrestricted, unbiased. Contact your nearest Link-Belt office or authorized distributor. Ask for the catalogs listed above.

LINK-BELT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,587

For more facts Circle 453 on Reader Service Card

THE BIG NEWS IN AIRLESS PAINTING

A rugged 5-gallon airless pump of simplified design. Provides peak "one-gun" performance!

Here's a portable unit that's designed for inplant maintenance jobs as well as limited-production painting. 5-gallon airless pump includes a proved air motor, clamp-on lid, 5-gallon material pail, and carrying handle. It may be used with your present DeVilbiss airless gun and hose. If you don't already have them, investigate DeVilbiss complete airless outfits. Priced as low as $300. Contact your nearest DeVilbiss jobber or representative! The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.

Only $192.50*

FOR TOTAL SERVICE, CALL
DEVILBISS

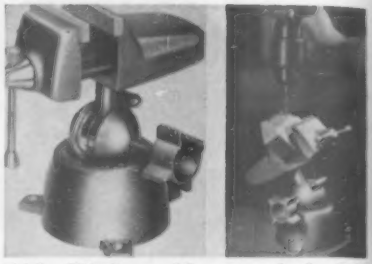
*Slightly higher in West

138 For more facts Circle 454 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.



146—Work positioner swivels full circle and tilts 180 deg. front and back. Low-cost PanaVise positions accurately even for close-tolerance drilling with machine tools. Single clamp knob locks unit in set position quickly and easily. Jaws open 2½ in. *Colbert Die Cast Co.*

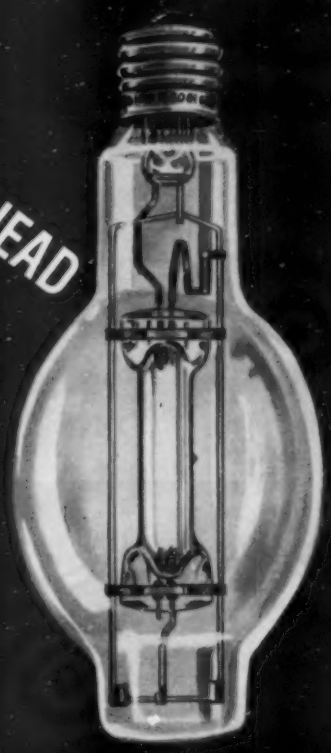
147—Private telephone system can be installed as single link and 10 lines, eventually expanded to 14 links and 100 lines. Automatic Dialmaster uses plug-in modules for easy maintenance. Features group hunting, conference service, executive right-of-way. *Stromberg-Carlson.*

148—Automatic battery chargers, for lead-acid, nickel-cadmium, silver-zinc, silver cadmium or nickel-iron types, need no attendance during charging. In wide range of voltages and currents. Silicon rectifier elements assure long, efficient service. *Christie Electric Corp.*

149—Radiation thermometer automatically measures, controls temperature (without contact) from 210 to 3300 F. Useful with rapidly moving and inaccessible surfaces. Ambient temperatures compensated from 50 to 120 F. Response time: 3/10 sec. *Radiation Electronics Co.*

Turn the page

YOU'RE LIGHT YEARS AHEAD



WITH WESTINGHOUSE

WESTINGHOUSE "LIFEGUARD" MERCURY LAMPS DELIVER 25% MORE LIGHT... LAST LONGER... REDUCE RELAMPING COSTS!

FOR INDUSTRIAL, STREET, PARKING LOT LIGHTING—Westinghouse "Lifeguard" Mercury Lamps give you up to 25% more light throughout their long life. Even after 12,000 hours or 3 years of service, you can expect almost the same light level as when the lamps were new! The reason . . . exclusive Westinghouse electrode design which virtually eliminates light robbing blackening of the arc tube.

You save on relamping labor costs, too, because "Lifeguard" lamps have the highest life rating of any lamps you can buy. In addition, they stand up in all kinds of unusually severe lighting conditions. Their special "Weather Duty" bulb construction is unaffected by rain, snow, corrosive gases, or thermal shock! "Lifeguard" lamps are available in 100 to 1000 watt sizes, and are interchangeable with other types of the same wattage.

Take advantage of the Westinghouse Lighting Cost Reduction Plan and cut costs by one or more of the following factors:

1. **Reduced cost of lamp purchases**
2. **Reduced lamp replacement labor costs**
3. **Increased lighting level for the same or lower costs**
4. **More efficient use of power**

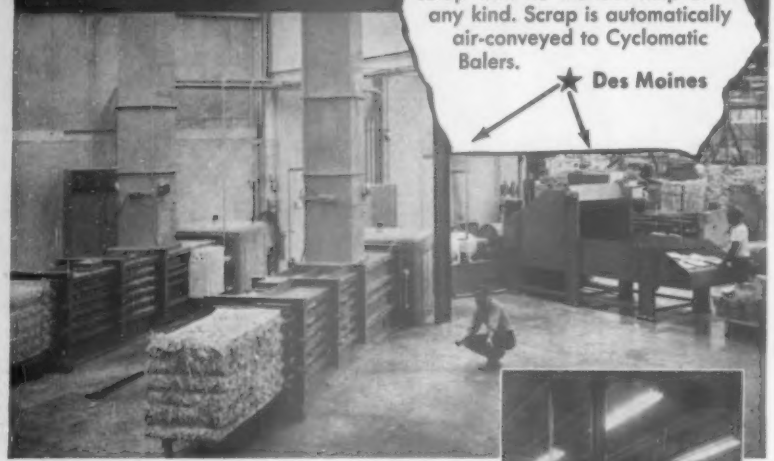
For more information, contact your authorized Westinghouse Lamp agent or nearest Westinghouse sales office. ***You can be sure... if it's Westinghouse.***

Westinghouse

Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey

For more facts Circle 455 on Reader Service Card

Here's how MEREDITH PUBLISHING CO. AUTOMATES Scrap Handling and Baling with a CYCLOMATIC® SYSTEM


Pick-ups at the numerous 3-knife in-line trimmers remove scrap with no manual help of any kind. Scrap is automatically air-conveyed to Cyclomatic Balers.
Des Moines

40 tons of scrap paper a day are handled and baled automatically by this BALEMASTER CYCLOMATIC SYSTEM for the publisher of *Better Homes & Gardens* and *Successful Farming*. Finished bales are extremely dense, clean, easy to handle and load.

Completely automatic operation is provided by an extremely simple, 5-situation visual control panel which gives the operator complete and instant command of all operations. Scrap is air-conveyed from the pick-ups at the trimmers through ducts and separators into the balers with no manual handling. Scrap signatures and other waste are also baled after being torn to pieces by the Cyclomatic Hogger.

"Right off hand the Balemaster Cyclomatic System has taken the hard work out of handling and baling. It's much easier now and we load the cars much faster" says Meredith's custodial foreman. Fast, automatic high-density baling is clean, economical, reduces storage space, lowers shipping rates.

If you have a scrap handling and baling problem . . . there is a Balemaster Cyclomatic System made up of standard components so versatile it will meet all your needs to perfection!

For the one company that can design, engineer, manufacture and install the complete integrated system — depend on Balemaster.

Write today for full information

Balemaster DIVISION OF
EAST CHICAGO MACHINE TOOL CORPORATION
4901 Railroad Ave. • East Chicago, Indiana • Phone: EXport 7-7470

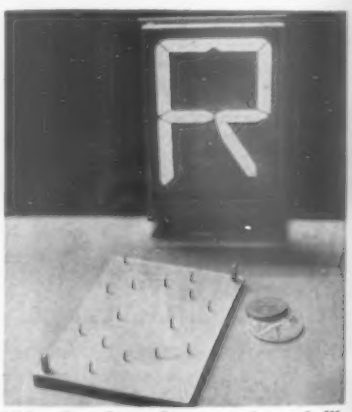
FACTORY / EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

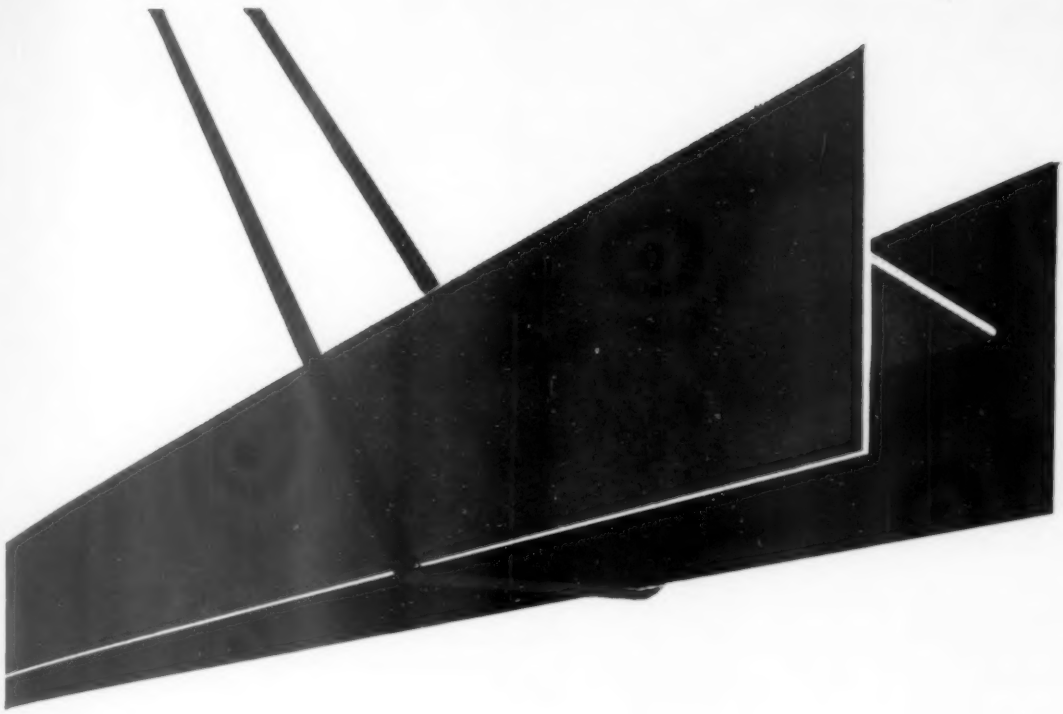
150—Safety ladder has 23x16-in. platform with rail guard for maximum protection—worker has both hands free. Comes with 3- to 12-ft. high platform for work 8 to 19 ft. above floor. Locks automatically when open. Lightweight. Stores compactly. *Dayton Safety Ladder Co.*

151—Motor starter, NEMA size 00, is a maintenance man's dream—has one "moving part" and contacts that can be inspected by removing with screwdriver or snapping in or out. Rated at 2 hp., for pumps, compressors, blowers, conveyors. *Federal Pacific Electric Co.*



152—Readout lamps, shaped like parallelogram (about 3¼ x 4¾ in.), can be read at distances to 150 ft. Make numbers and letters easy to read at wide angles. Operate at 240 or 460 v., 60 or 400 cycles per sec., 0.01 watt. Rated life: 5000 hours. *Westinghouse Electric Corp.*

Turn to page 145



Now! A low-cost way to automate inventory control–

Keysort® Data Processing

Fast accurate inventory control is at your fingertips with low-cost Keysort Data Processing.

Hundreds of plants are using this modern method to obtain up-to-the-minute information on inventory and in such other vital areas of plant control as labor costing, operation costing and production control.

Fits any size plant

Keysort has many advantages. No restrictive procedures, minimum training, remarkable economy, simplicity of installation and operation. In fact, Keysort is the only automated data processing system flexible enough to fit your plant as it stands *and* as it grows. And at a cost well within your company's budget.

Cuts clerical work

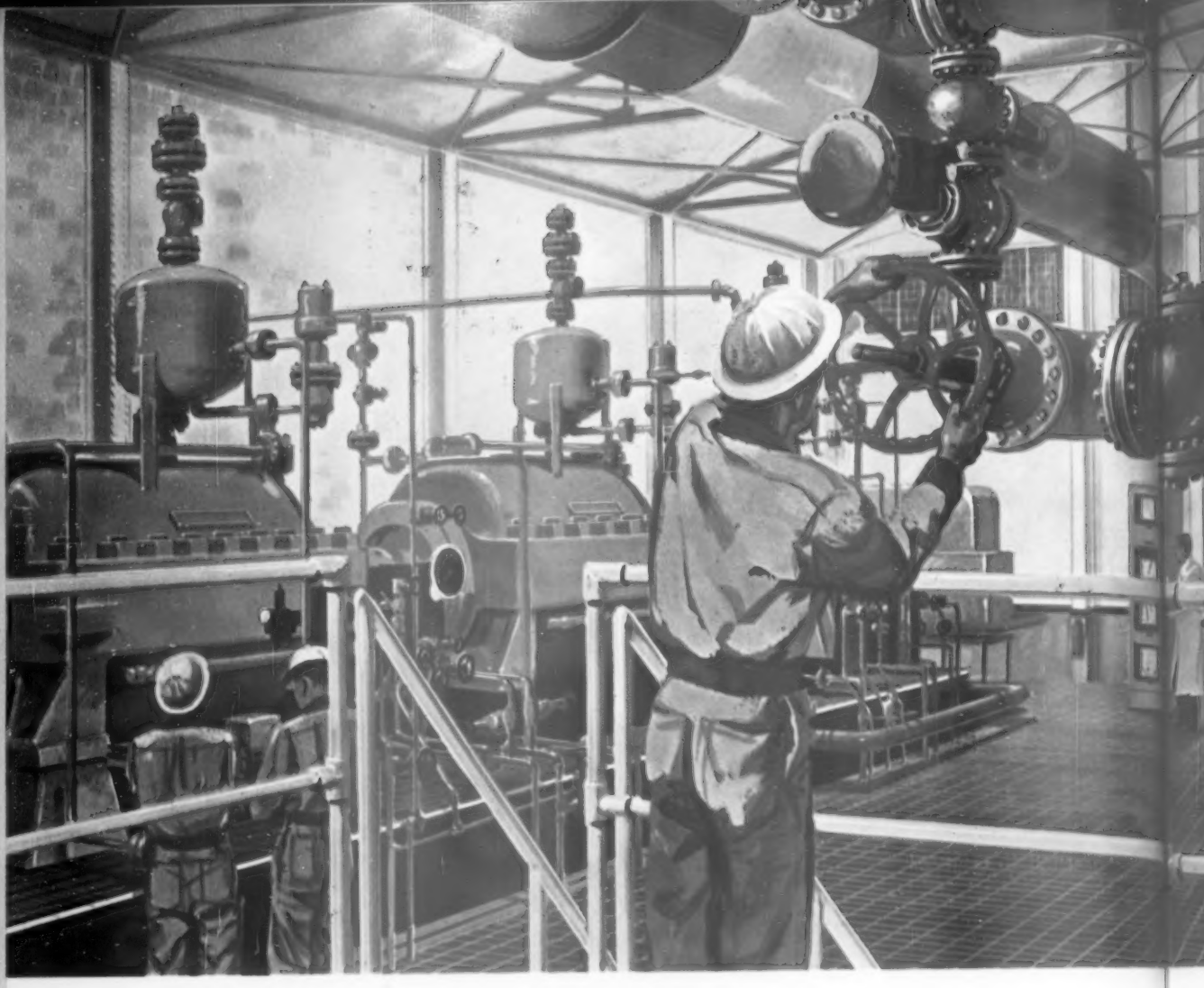
With Keysort you use easy-to-handle punched cards – mechanically created for rapid sorting and classification. Results are automatically tabulated and summarized direct, to give you the meaningful on-time information you need for complete control of your plant and your profits.

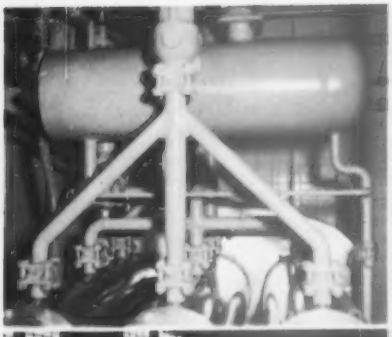
Ask us for case histories

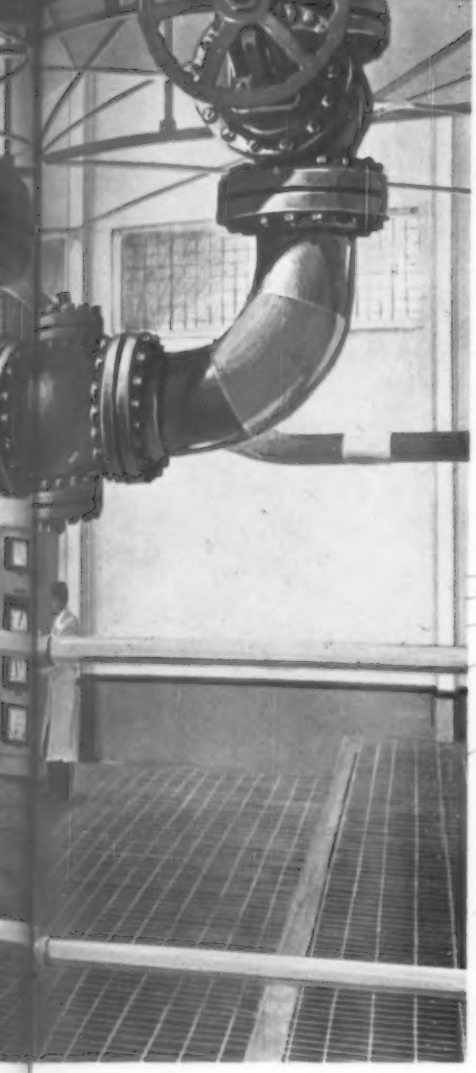
Your nearby Royal McBee Data Processing Systems Representative has had a wealth of experience in solving plant control problems. Working with your plant managers and foremen, with your systems and procedures experts, he can offer helpful advice about the low-cost Keysort system tailored to your individual requirements. Call him, or write us at Port Chester, N. Y.–indicating the applications in which you are interested – and we will be happy to supply you with actual case histories from our files.

ROYAL McBEE *corporation*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION







Rust-Oleum

NEW COLOR HORIZONS

System

HERE is a modern, functional *system* that combines four important points. (1) the ability to stop rust, (2) modern color harmony, (3) durability to last and last, (4) ease of application. From machinery, equipment, and structural steel to tanks, steel fences and metal sash – the Rust-Oleum New Color Horizons System can provide lasting beauty in the colors of your choice. Ask your Rust-Oleum Industrial Distributor, together with your Rust-Oleum Factory Specialist, to make a survey of your plant and provide complete recommendations. Rust-Oleum Industrial Distributors maintain complete stocks for prompt delivery in all principal cities of the United States, Canada, and in many countries around the world.

Rust-Oleum, in its various forms, can also save you time and money on problems like these: Heat Resistance, Water Resistance, Chemical Resistance, Coating Galvanized Metal, Speedy-Dry Coatings (less than thirty minutes to dry).

PROVED THROUGHOUT INDUSTRY FOR OVER THIRTY-FIVE YEARS

RUST-OLEUM®

See our catalog in Sweet's.

STOP RUST by applying Rust-Oleum 769 Damp-Proof Red Primer directly over the sound rusted surface

Save time, money, and metal. Brush Rust-Oleum 769 Damp-Proof Red Primer right over the remaining sound rusted surface after scraping and wirebrushing to remove rust scale and loose rust. **Specially-processed** fish oil vehicle penetrates rust to bare metal as proved in radioactive tracing studies.

STOPS RUST!®

Distinctive as your own fingerprint. There are imitations, but only one Rust-Oleum.

Insist upon industry-proved Rust-Oleum. Accept no substitute.

You take the brush! Try a free test sample!

ATTACH TO YOUR LETTERHEAD

RUST-OLEUM CORPORATION
2985 Oakton Street • Evanston, Illinois

At no cost or obligation, please send me:

- ☐ New full-color catalog on New Color Horizons System and specialized Rust-Oleum systems, including color charts and applications.
- ☐ FREE TEST SAMPLE of Rust-Oleum 769 Damp-Proof Red Primer.
- ☐ Please have your representative contact us to discuss a plant survey.

New Safety-Lock Tab • Improved Cup Shape Add Increased Protection and Comfort to AO Flexible Mask Goggles

Here are four improvements that make these new AO Vinylite Mask Goggles safer to use, more comfortable to wear:

1 New lock tab, with snap button, holds lens securely to frame at point of greatest stress, improves fit around entire frame. Lens will not pop out, but can be removed quickly and easily for cleaning or replacement.

2 New recessed slots at end of cup fit *over and around* temples of safety (or regular) glasses to keep entire cup edges in contact with face.

3 Increased eye cup depth gives additional coverage and protection at temples.

4 Improved flash around entire edge of mask molds to contours of face.

Lightweight, well-ventilated, extra-large face mask and .050″ thick acetate lens assure the wearer of comfortable, optically correct, wide-angle vision while protecting entire eye area.

Your nearest AO Safety Products Representative now has this improved new model in impact goggles, chemical goggles, welding goggles, or chipping and grinding goggles, as well as two special models for maximum protection against chemical splash. Contact him today, or write for detailed folder, S-1229.

Your Surest Protection . . . AO SURE-GUARD GOGGLES

American Optical
COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS

For more facts circle 459 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

153—After-cooler, for small and medium compressed air systems, is low-cost, easy to install. Has no moving parts, thus little maintenance. Cools air to within 85% of cooling-water temperature. Compact, processes from 50 to 120 cfm. of free air. *Jas. A. Murphy & Co.*

154—Air-cooled compressor, for round-the-clock operation, delivers 509 to 565 cfm. of air at pressures to 125 psi. Compact, weighs 2200 lb., it uses 30 to 50% less space than other compressors of this capacity. Runs two weeks before needing oil. *Atlas Copco, Inc.*

155—Air-handling troffer can be used as supply and/or return unit to meet UL specifications. Uses 40-watt lamp in 1x4- and 1x8-ft. housings with 2 and 3 lamps. Or 2x4-ft. housings with 2, 3, and 4 lamps. For nearly all acoustical ceilings. *Sylvania Electric Products Inc.*

Turn the page

PAYLOADER® handling

helps modernize plant

One of the largest, best equipped foundry operations in the New England area belongs to Brown & Sharpe Mfg. Co., Machine Tool Division, in Providence, R. I. Since completing a thorough modernization program, they use four "PAYLOADER" tractor-shovels to move molding sand, coke and limestone and transport scrap and cast iron to various points in the foundry.

Paul Roy, Foundry Labor foreman, has this to say about their Model H-25 "PAYLOADER": "I find the H-25 fast and efficient . . . it has power to get the job done quick and is easy on the operator . . . its short turning radius enables the operator to work in crowded areas without damaging the floor work". They estimate the H-25 handles about 20 tons of sand per hour, working within a maximum 500 lineal foot haul.

Mobility, speed and operating ease are familiar trademarks of the H-25. With only 6-ft. turning radius, it features 2,500-lb. operating capacity, *complete* power-shift transmission, torque converter drive, power-steering, power-transfer differential and fast, powerful hydraulic bucket control. A closed, pressure-controlled hydraulic system, and filters and seals throughout the machine, protect its mechanical and electric parts from damage due to dust, moisture and corrosion.

If you want to modernize and increase output on your plant bulk handling operations, make it a point to talk "PAYLOADER" with a Hough Distributor nearby. There's money-saving performance built into all "PAYLOADER" units . . . and there are 8 sizes and 20 models (up to 12,000-lb. operating capacity) to fit every material handling need. Contact your distributor today, or write for more details.

HOUGH®

THE FRANK G. HOUGH CO.
755 SUNNYSIDE AVENUE
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

Send PAYLOADER bulletin "Industrial Material Handling from A to Z".

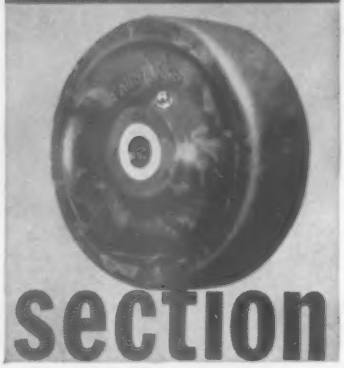
Name _____
Title _____
Company _____
Street _____
City _____
State _____

3-A-2

For more facts Circle 460 on Reader Service Card

Now one wheel for any section of your plant

New Lamilon
NYLON-REINFORCED
ALL-PLASTIC WHEELS
(patent pending)



Now, for the first time, you can standardize on one wheel for all your materials handling equipment in any section of your plant. Regardless of the types of floors or floor conditions, Fairbanks new "LAMILON" Wheels will:

- **Protect your floors. "LAMILON" Wheels stay smooth and concentric, will not mar or mark, because of exceptionally high impact strength and abrasion resistance.**
- **Show no affect from oils and greases and a very high resistance to most chemicals. "LAMILON" Wheels have a water absorption factor almost as low as high quality rubber and will not deteriorate in wet floor conditions.**
- **Roll easier with alloy steel roller bearings, hardened steel outer race and provision for pressure lubrication. "LAMILON" Wheels roll easier than semi-steel wheels in most instances.**
- **Last longer and give more dependable service than any other plastic wheel.**

"LAMILON" Nylon-Reinforced All-Plastic Wheels are available in sizes 3 through 12 inches and can be furnished with thread-tight thread guards.

Fairbanks complete line of industrial caster and truck wheels includes the finest vulcanized rubber tired wheels (sizes 3″-18″) on the market, solid rubber wheels (sizes 2″-6″) and semi-steel wheels (sizes 2″-16″).

FAIRBANKS "LOCKWELD" CASTERS WITHOUT KING-PIN

Easiest swiveling, longest lasting. Unique patented "LOCKWELD" construction eliminates king-pin, chief source of caster failure.

Illustration: Series "23" double ball race swivel casters, sizes 3″-8″. Single ball race swivel casters, sizes 2″-6″ and matching rigids available.

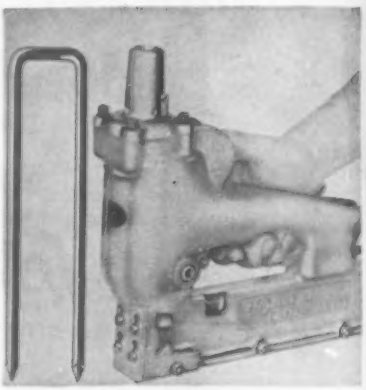
THE **Fairbanks** COMPANY

Executive Office — 393 Lafayette Street, New York 3, New York
Valves • Dart Unions • Casters • Trucks • Wheels
●520 Atlantic Ave., Boston 10, Mass. ● 393 Lafayette Street, New York 3, New York ●15 Stanwix St., Pittsburgh 22, Pa. ● 202 Division St., Rome, Ga. ● **Factories** — Rome, Georgia and Binghamton, N. Y.

FACTORY/EQUIPMENT NEWS

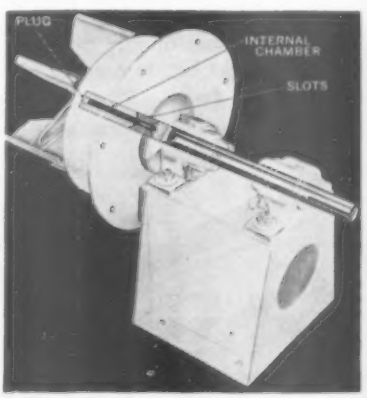
Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.



156—Portable air gun drives staples (to 2 in.) to build or repair crates, boxes, pallets, other fiber and wood containers in short time. Positioning guide permits unskilled operator to use stapler accurately. Staple legs "fishhook" for optimum holding power. *Spotnails, Inc.*

157—Stepless input control, for furnaces, uses solid state switching (with silicon-controlled rectifiers) to achieve full range control proportional to d-c pyrometer signal. Power can be fully shut off. Capacities to 75 amp., to 230 v. a-c. *Stepless Controls Corp.*



158—High-temperature fan uses air-cooled shaft to eliminate need for water cooling, heat slingers, other complex cooling devices. For ovens, kilns, furnaces, dryers, etc. Operates efficiently under high speed and pressure, and heats to 1700 F. *Garden City Fan & Blower Co.*

Turn the page

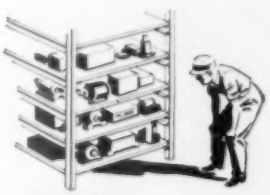
Out of Storage for Assembly...in 3 minutes

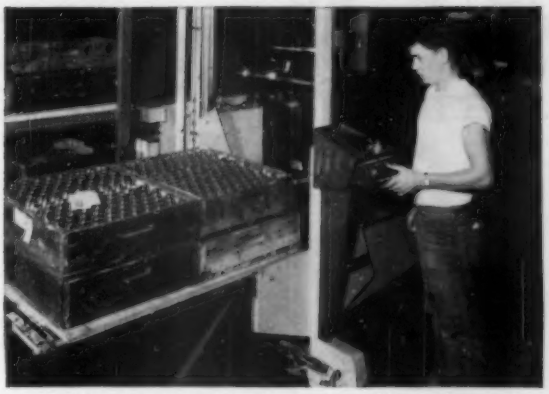
TRIAX® RETRIEVERS® give random storage of boxes, pans and baskets

At the Mariemont, Ohio, Plant of American Standard, two Retriever units are used to handle a wide variety of small parts until needed on the assembly line. Economical runs of machined parts are held in storage along with small purchase parts. Upon release of assembly orders all parts are instantly available.

INVENTORY SAVINGS REALIZED . . .

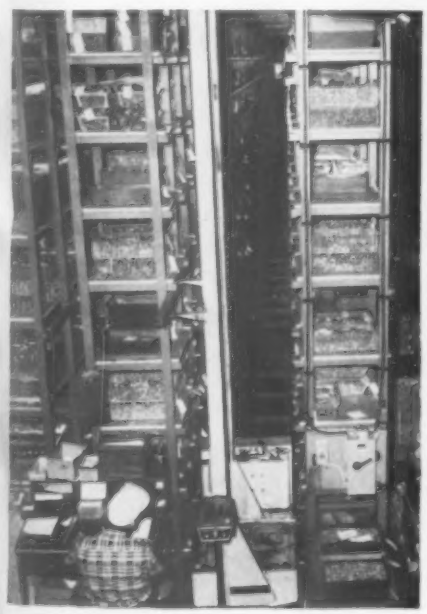
Physical inventory time is greatly reduced and damage to or loss of parts is minimized, permitting an overall reduction of total inventory.





Push-key storage sends load to any available opening . . . offers 100% selectivity.

Floor-to-ceiling storage makes maximum use of available space.



A wide variety of parts and containers are stored on slab pallets, at pin-point location.

One operator programs the two units and carries out record keeping during the cycles.

THE TRIAX COMPANY

SWeetbriar 1-9800

11955 SHAKER BLVD. • CLEVELAND 20, OHIO

1. INSTALL MACHINERY FAST
2. LEVEL 3. LICK VIBRATION

NEW LEVEL-RITE SERIES 500

Cut machinery installation time and costs up to 70, 75, even 80% . . . eliminate transmitted vibration up to 85%! That's the money-saving move with Level-Rite Series "500" — latest member of the Unisorb family. No lagging, no cement, no drilling, no "hit or miss" spotting is needed. Unisorb Level-Rite mounting is fast — machines can be moved and relocated quickly and with a minimum of downtime.

Level-Rite Series "500" is a self-contained leveling mount for light and medium duty machine shop tools. It withstands weights up to 750 lbs. Send for literature.

SPECIAL ADVANTAGES: Fast, simplified, precise leveling • Free-floating screw post — compensates for uneven floor • Safe, sure grip — can be cemented if needed • Lowers noise level — increases worker efficiency • Better machine performance (improved alignment) • Available in many types and thicknesses for all machine types • Money-back trial is yours for the asking.

FCO-42

UNISORB

UNISORB 206 SOUTH STREET, BOSTON 11, MASSACHUSETTS
Division of The FELTERS Company
New York, N. Y. • Chicago, Ill. • Detroit, Mich. • Upper Darby, Penna. • St. Louis, Mo. • Taylor Felt & Supply Co., San Francisco, Calif. • Acorn Mfg. Co., Los Angeles, Calif.

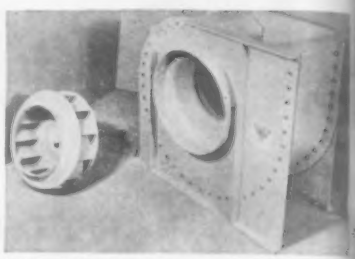
Please send me a Unisorb Sample and Free Book ☐
Please send literature on Unisorb Level-Rite "500" ☐

Name.....
Company.....
Address.....
City.....Zone.....State.....

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.



159—Plastic blower housing with fan is highly resistant to corrosive chemicals and fumes. Offers high strength and weight ratios. Can be installed as component in existing systems. Unit shown handles free chlorine fumes at temperatures to 250 F. at 12,000 cfm. *Ceilcote Co.*

160—Electronic counter has special sensing device for high speed lineal measuring. Counts rotations of delivery roll and senses whether material is present or not. Can be used to count wire, cable, paper, cloth, and film. Adapts to simplified automation. *Veeder-Root Inc.*

161—Mobile lift has platform that rotates full circle, extends 6 ft. with load to 400 lb. Hydraulically operated Skyliner telescopes from 8 to 15 ft. Self-contained water system (operates in motion) has 3-compartment sink on platform. Battery powered. *Grand Specialties Co.*

Turn the page

You can do more with DELTA Metal Lathes

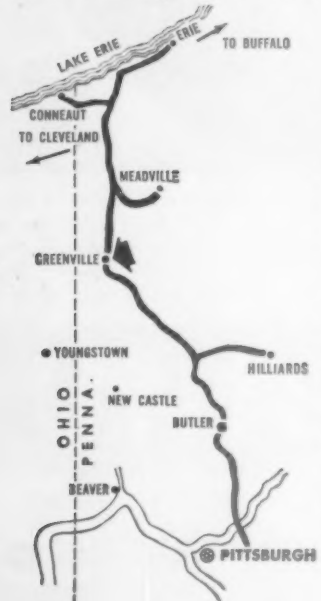
Checking closely on tolerances, time and dollars? These accurate, versatile, low-cost machines can pay their way on your jobs. To see a Delta Metal Lathe in action, write for the name of your nearest Delta Lathe Dealer and get a FREE CATALOG: Rockwell Manufacturing Company, Power Tool Division, 628C North Lexington Avenue, Pittsburgh 8, Pennsylvania.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL

Attractive, Level, Flood-Free Land
Close to Metropolitan Markets of
Pittsburgh, Cleveland and Buffalo



This adaptable 750 acre plant site is ideally located adjacent to Greenville, Pa., and is only 80 miles from Pittsburgh and Cleveland; only 150 miles from Buffalo. Next day rail delivery to these points.

Extensive deposits of coal, limestone, clay and aggregates nearby. Steel and other basic materials available with 24-hour delivery service.

Investigate today! Write or phone for *location factors* of this site.

BESSEMER and LAKE ERIE RAILROAD CO.

INDUSTRIAL DEVELOPMENT DEPARTMENT

1828 FRICK BUILDING • PITTSBURGH 30, PA. • ATLANTIC 1-4780

The Bessemer Man is at your "Site Service"

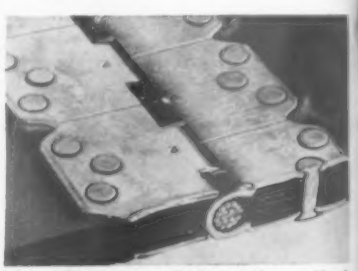
FACTORY / EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

162—Adjustable hole cutter makes 1⅛ to 2¼ in. diameter holes in wood, plastic, aluminum, metal. For use with powered hand drills and small drill presses. Size is adjusted simply by loosening nut at top and setting blades according to easily read scale. *Zoron, Inc.*

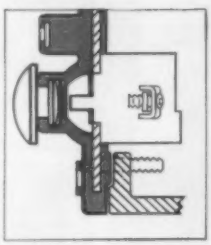
163—Motor pulley drives, 1 to 15 hp., have variable speeds from 2200 to 141 rpm., with 3:1 ratio using 1750 or 1160 rpm. motors. Simply designed, yet with efficiency of V to V drive transmission. For centrifugal pumps, presses, hoppers, shakers. *Sterling Electric Motors, Inc.*



164—Conveyor belt splice eliminates need for templates, drilling or hole punching. Permits installing hinge-type splice in one piece for tight, leakproof, flexible joint. Reversible "Minuet" splice comes in 1/32 to 1 in. belt thickness, up to 72 in. wide. *General Splice Corp.*

Turn to page 154

NEW!
ALL-RUBBER *Flexitite* PUSH-BUTTON STATION



Oil-tight Construction At Less Than "Heavy Duty" Prices

Fits All Standard FS & FD Boxes.
Completely Corrosion Proof.

One Piece Molded All-Rubber Construction.
Completely Packaged — Includes Set of Eight Plastic Legend Inserts and Three Buttons.
ONE STATION FOR ALL LOCATIONS (except hazardous).

261.1 **Write for Free Bulletin B-82**

JOY ELECTRICAL PRODUCTS DIVISION
1245 Mecklind Ave., St. Louis, Mo.
Exec. Offices, Henry W. Oliver Bldg. Pgh., Pa.

For more facts Circle 466 on Reader Service Card

JUST WON'T SLIP!

STYLE NO. 411

The rough finished latex coating of this Granet **SLIP-NOT** glove provides thousands of gripping edges that really bite . . . like a tread on a tire. It just won't slip! A rugged, general purpose work glove . . . ideal for handling lumber, concrete, metal, glass and other 'hard-to-handle' materials.

Whether you are concerned with grease, chemicals, mechanical abrasion or other hand protection needs, check the Granet Line of gloves first.

Write . . . on your letterhead for a free pair. Test them yourself!

Granet Gloves . . . manufactured under stringent quality control methods . . . are guaranteed as first quality.

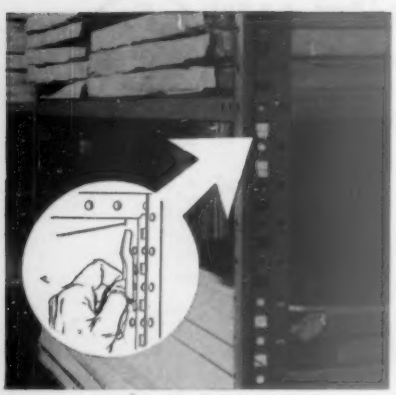
THE *GRANET* CORP.
25 LORING DRIVE, FRAMINGHAM, MASS.

For more facts Circle 467 on Reader Service Card

Introducing . . . new low cost Barclite XR1000 Fiberglass Panels . . . last years longer . . . give more light! New Acrylic base resin makes translucent Barclite XR1000 absolutely weather-resistant! Panels available corrugated and flat, smooth or crinkle finish. (Write for results of 5-year outdoor torture tests!) Colors stay clearer, brighter, purer. Can't shatter, can't rust. Immune to mildew, most chemicals. Maintenance-free, too! Exclusive Infrablok® process insulates against heat, cold. Perfect for roofing, siding, skylighting, glazing, interior partitions—wherever you need strength plus light! Write Barclite Corp. of America (An affiliate of Barclay Mfg. Co., Inc.) Dept. F-3-XR Barclay Bldg., New York 51, N. Y.

Products of quality . . . through research

For more facts Circle 468 on Reader Service Card 151



REPUBLIC CLIP SHELVING saves valuable floor space. Complete line, including shelves, parts, accessories, and related items. Every piece Bonderized. Erects fast, easy. No tools required. Adjustable arrangements meet changing shelving needs. The shelf snaps firmly into place. Let your Republic representative storage-engineer your shelving problems. Call, or send coupon today.

REPUBLIC METAL LUMBER provides faster, stronger, safer framing in any application where common building materials are now being used. Simply measure, cut, assemble. Engineered slotted angle pattern speeds erection, reduces time and material costs. Bonderized. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths. Call or write for attractive brochure.

REPUBLIC PORTABLE DRUM RACK . . . newest idea for storing 55-gallon drums. Strong and sturdy. Six-piece bolted construction. Assembles quickly and easily. Demountable for shipping. Designed for easy stacking and storing. Weighs only 39½ pounds. All-steel channel construction. Saves valuable floor space. Available for immediate delivery. Send coupon for more information.

For more facts circle 469 for hopper Boxes, 470 for clip shelving, 471 for Metal Lumber, 472 for drum racks

RACK, STACK and PACK

Republic Standard Hopper End Boxes

They do it at Flexible Steel Lacing Co.

This manufacturer of belt fasteners for conveyor belting, racks and tilts standard Republic Hopper Boxes at a 45° angle along assembly counters. Parts slide down onto counters as needed.

Now, boxes packed with parts stack four and five high, saving floor space and eliminating clutter prevalent when former wooden boxes on casters were used.

This modern, efficient, small parts handling system is another example of how Republic Material Handling Specialists can adapt economical standard boxes to solve particular problems. This ingenious, money-saving system was engineered by Thornel Associates, Republic's Chicago material handling specialists.

Republic's big line of standard units can provide the basis for the system you need to speed operations, save space, time and money. Call your Republic representative or return coupon below.

Flexible Steel Lacing Company speeded assembly operations and took the stoop out of the job with Republic Corrugated Boxes. Special tilting racks behind work counters were designed to hold boxes at an angle so that parts fall onto the table as needed. Easy to stack and store, Republic Boxes save valuable floor space, too.

Strong, Modern, Dependable

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. FA-1679
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on the following products:

☐ Republic Material Handling Units ☐ Hopper Boxes
☐ METAL LUMBER® ☐ Clip Shelving ☐ Drum Racks
☐ Please have a Republic material handling specialist call

Name_____ Title_____

Firm_____

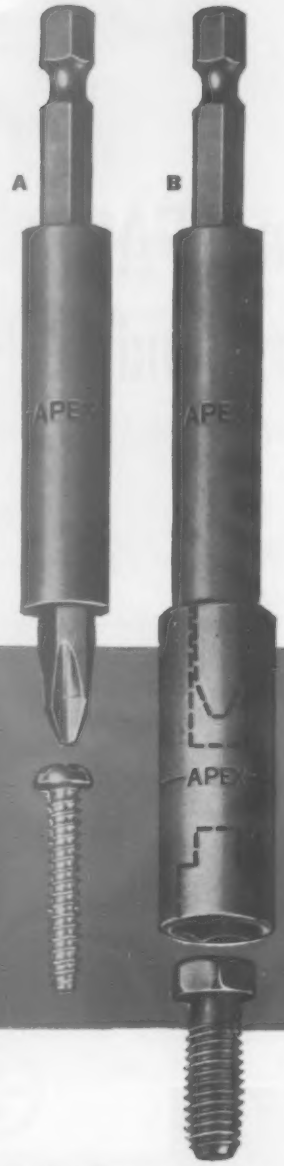
Address_____

City_____ Zone____ State_____

In assembly and fastening work, a tool operator may be driving screws one minute, running nuts the next.

To keep this work moving right along, you could use two power tools, or one power tool equipped with a slip chuck, to interchange bits and sockets.

But the best way to make one tool do two different jobs is to use an Apex socket that slips right on over the bit—in just seconds you're ready to run down nuts and bolts. The socket can be removed just as quickly when it's time to drive screws again. The Apex method makes for better, safer work, too, because there are fewer accessories on the tool and consequently far less wobble and looseness.



This APEX Socket converts a screwdriver into a nut runner ...in seconds!

Apex—the authority on fastening—offers the most complete line of standard and magnetic fastening tools, plus an array of specials that have solved some of the most unusual fastening problems. Write, on your company letterhead please, for

CATALOG 30-A
Nut Running Tools, ¼" to ⅝" hex, square drives.

CATALOG 30-B
Nut Running Tools, ¾" to 3½" hex, square drives.

CATALOG 30-C
Screwdriving Tools.

A. Apex M-490 Magnetic Bit Holder, with ¼" hex shank Apex Insert Bit to drive Phillips screws. Bit holder available in non-magnetic type.

B. Apex WJ-196-F Socket, to run 7/16" hex bolts, nuts. Solid hex shank on insert bit provides firm connection for ¼" female hex drive on socket. Socket available in magnetic type.

APEX FASTENING TOOLS
SCREWDRIVING • NUT RUNNING • SPECIAL
The APEX Machine & Tool Co. • 1023 So. Patterson Blvd. • Dayton 2, Ohio

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

165—Oil circuit breaker, single-tank type, occupies about 15 sq. ft. Needs less time to install than other units in 4 to 15 kv. range. Rated 5 cycles, 100, 250 and 500 mva. Has only half usual number of moving and stationary contacts. *Federal Pacific Electric Co.*

166—Welding wire, known as A602, used with low cost CO_2 shielding gas and Aircomatic equipment, produces quiet, spatter-free, quality welds in mild steel. Sprayarc process makes visible arc about ⅛ in. long. Wire diameters: 0.045 and 0.054 in. *Air Reduction Co.*

167—Vibration monitor, with three sensitivity ranges, measures amplitudes below 10 microinches and detects changes of one or two microinches. Completely transistorized, works in conjunction with magnetic vibration pick-ups. Protects compressors, motors. *Indikon Co.*

Turn the page

Another first from Standard Conveyor

New continuous vertical conveyor revolutionizes floor-to-floor movement

Escaveyor* self-loads, self-unloads, lifts products straight up or down without tipping or jarring. Provides smooth up, down, or reversible service.

How Escaveyor speeds production. Here is the answer to your big need for a fast, continuous flow of commodities from floor to floor. Escaveyor moves commodities at a steady rate of 8 to 10 loads per minute.

How Escaveyor saves space. Escaveyor lifts packaged or unit commodities rapidly from floor to floor with the continuity of a belt conveyor. Yet your product always rides level. And look at the huge saving in space! It takes even less floor space than a conventional monostrand or straight-lift conveyor! Escaveyor's size is tailored to fit your package.

How Escaveyor costs less. Escaveyor actually costs less to purchase and install than practically any other type of lift. It requires less manpower because no manual loading or unloading is required. You also save many square feet of valuable floor space.

Free brochure. Send for free Escaveyor brochure! It tells how Escaveyor works, and how it can solve vertical material handling problems for *you!* Get your copy from Standard Conveyor Company, 304-C Second Street, North St. Paul 9, Minnesota, or from your nearby Standard Conveyor sales representative.

*patent pending

Standard Conveyor

Sales and Service in over 40 Cities
Consult your Yellow Pages

ERIEZ *Magnetic Minute*

60 seconds that will help you improve operating efficiency.

Get UNWANTED IRON out of your product and flow lines

PATENTED

Can you be sure there's no fine ferrous contamination or tramp iron in your finished product or your flow lines?

You can if you install powerful Permanent Eriez Grate Magnets strategically. Now you can have foolproof magnetic protection where you've never been able to have it before.

- Choose from the most complete selection available . . . wing types, drawer types, multiple bank, rotary type, grates in housings, Rota-Grates in housings, and odd shaped assemblies — in 162 sizes.
- Performance is near perfect on a multitude of free-flowing bulk materials to ½ inch diameter. Special units available for liquid lines.
- Quickly and easily installed in steep-sloped hoppers, odd and regular shaped hoppers, floor openings, vertical closed chutes, ducts, etc.
- Erium® powered for more magnetic strength. Erium is our exclusive power source, designed to fit your application.

There's an Eriez Permanent Grate Magnet to solve your problems of ferrous contamination . . . yes, even problems which you may not know exist.

For big new bulletin, write to:

ERIEZ MANUFACTURING CO.

70QA Magnet Drive, Erie, Pa.

MAGNA-THOUGHT

"First cost is last cost", This is the policy we believe is best in the long run for our customers and ourselves.

R. F. MERWIN
President

ERIEZ

A GROWTH COMPANY . . .
10 NEW PRODUCTS IN THE LAST 5 YEARS

FACTORY/EQUIPMENT NEWS

Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.

168—Telephone booth with acoustical lining inside wall and ceiling permits private conversations undisturbed by noise. Good for high noise level areas. No ventilation problems with open booth design. Needs only wiping with damp cloth to keep clean. *Burgess-Manning Co.*

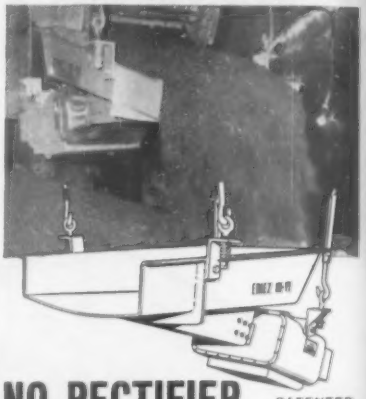
169—Rapid-reversing motor, for high production tools, offers up to 125 idle reversals/min. in open-type models, and up to 200 idle reversals /min. with blower-cooled models. Come in integral hp., polyphase ratings, open, TEFC, and non-ventilated housings. *Louis Allis Co.*

170—Vibration signal analyzer and portable balancer measures, analyzes vibration in machinery, buildings, pipe lines. Has amplitude range of 5 microinches to 100 millinches. Unit, with stroboscope, operates on 110-v. a-c or battery pack. Transistorized. *RayData Corp.*

Turn the page

ERIEZ *Magnetic Minute*

60 seconds that will help you improve operating efficiency.



PATENTED

NO RECTIFIER NEEDED WITH ERIEZ HEAVY-DUTY VIBRATORY FEEDERS

AC powered Eriez Hi-Vi vibratory feeders move large tonnages of bulk materials with accurate control . . . more efficiently and economically. Illustration shows one of a number of Eriez units available for heavy feeding applications where **big capacity and accuracy** are essential.

Whatever your application, there is an Eriez electro-permanent magnetic feeder that will meet your exact needs. And you get this exclusive combination of advantages: No rectifier needed . . . AC operation. Totally enclosed drive element ideal for hazardous, dusty, wet and corrosive installations. New fibre glass springs assure superior performance and control . . . longer life because spring breakage is practically eliminated.

The full line of Eriez Hi-Vi vibratory feeders includes models with feeding capacities ranging from ounces to many tons per hours.

Write for descriptive bulletin to:

ERIEZ MANUFACTURING CO.

70QB Magnet Drive, Erie, Pa.

MAGNA-THOUGHT

Constant research, development and refinement are the keys to new and improved products. New and improved products are the keys to a company's growth.

A. F. ISRAELSON
Chief Engineer

ERIEZ

A GROWTH COMPANY . . .
10 NEW PRODUCTS IN THE LAST 5 YEARS

Arch Heiss, Master Craftsman at Esterline Angus for 26 years

Experienced Craftsmanship

...*solid foundation for reliability and performance*

Standing solidly behind the creative designs of our engineering staff are our 50-plus years of experience . . . the highly-developed skill and attention to detail of our master craftsmen.

An example of our meticulous care: Mr. Heiss is shown above making a final check on a chart drive mechanism, the heart of any recording instrument. To insure its accuracy and its ability to withstand rugged industrial use, this delicate device like all others in our precision instruments is manufactured in our own plant. At any of the five standard hour speeds, the timing accuracy is of the order of 99.95% per week!

For dependable, trouble-free performance covering a wide range of applications, insist on modern Esterline Angus recording instruments—the highest reliability rating in the industry.

New Analog-Event Recorder—Now, *one* instrument does the work of *two*. Write for descriptive folder. Address: ESTERLINE ANGUS INSTRUMENT COMPANY, INC., Box 596B, Indianapolis 6, Indiana.

Excellence in graphic recording for over 50 years—ESTERLINE ANGUS

For more facts Circle 477 on Reader Service Card

Rugged Design...
Easy-to-Handle Balance

RIDGID®
HEAVY-DUTY
PIPE
CUTTERS

give faster, straighter cuts

Five Sizes for ⅛" to 6"

FACTORY TESTED

Pick up a RIDGID Heavy-Duty Pipe Cutter, and you'll instantly know why it makes pipe and conduit cutting far easier. Perfectly balanced . . . gives you a feel of confidence no other cutter can match. See the extra-long shank that protects handle threads . . . assures easy pressure application. Feel the large, smooth handle that gives you a comfortable, powerful grip. Try it, and you'll find a built-in cushion to keep the cutter wheel "on track" through hard or uneven spots. Rugged frame, guaranteed not to break or warp, stays straight for clean cuts every time.

You'll Want a RIDGID 4-Wheel Pipe Cutter for Work in Tight Places!

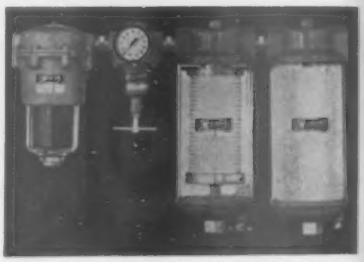
Call your Distributor today. For your convenience, he maintains a complete stock of RIDGID Work-Saver Pipe Tools and Parts!

RIDGID
The Ridge Tool Company, Elyria, Ohio, U.S.A.

FACTORY / EQUIPMENT NEWS

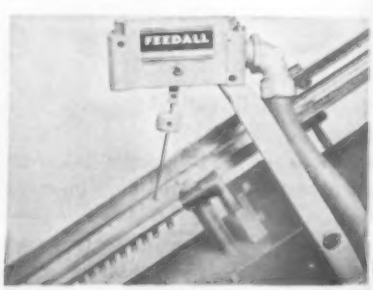
Begins on page 102

For more about these items, circle item numbers on Reader Service Card next to back cover.



171—Compressed air dehydrator, for those not needing instrument-pure air throughout plant, consists of moisture remover, air regulator, and filter. Available separately or as one unit. Rated 10 cfm. at 100 psi. Desiccant changes color when saturated. *Wilkerson Corp.*

172—Flexible high-capacity cable carries heavy a-c load with minimum heating. Can be safely bent and looped. Adapts to easy making of coils for induction heating. Also replaces braided shunts. Sizes from 210 to 500 mcm., 250 to 1000 amp. capacities. *Electric Arc, Inc.*



173—Bank control switch regulates flow rate of small or lightweight parts. Moving workpiece must exert only 1/3 oz. pressure to maintain desired flow rate. Pressure can be changed by adjusting counterweight on sensing arm. Operates on 110 or 220 v. *Feedall, Inc.*

Automatic Model ELF with Current-Miser Control

Does more work per battery charge

than any other electric truck!

Here's the lift truck that gives you even greater economy in battery powered electric lift truck operations—and then some! Thanks to Automatic's exclusive Current Miser Control, Model ELF works up to 60% longer in maneuvering operations per battery charge. Battery power previously lost in maneuvering operations through wire or carbon type resistors is now put to work which means more tons of material moved at less cost.

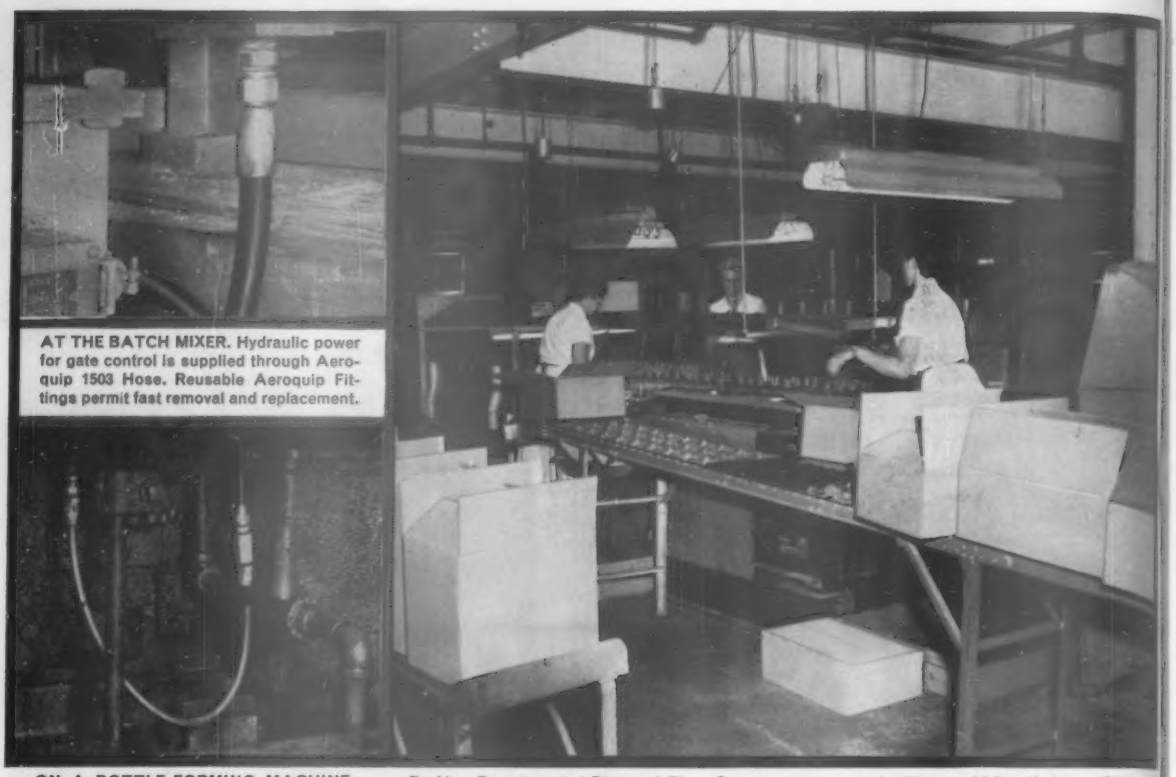
You'll find Model ELF's high torque characteristics a real plus in climbing up to 15% grades under full load. Its fast travel and lift speeds make it ideal for plant and warehouse operations.

Get the full story on the ELF series of electric trucks in capacities from 3,000 to 10,000 lbs. **Write today for specification bulletins on the ELF series.**

FIRST in Imagination... FIRST with Reality

AUTOMATIC AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale and Towne Manufacturing Company
39 W. 87th Street, Dept. C1,
Chicago 20, Illinois

For more facts Circle 479 on Reader Service Card



AT THE BATCH MIXER. Hydraulic power for gate control is supplied through Aeroquip 1503 Hose. Reusable Aeroquip Fittings permit fast removal and replacement.

ON A BOTTLE-FORMING MACHINE. Here, Aeroquip 2807 Hose of Teflon withstands high ambient heat and provides continuous service to maintain peak production.

Packing Department at Diamond Glass Company, a progressive 50-year-old firm that manufactures over ten million bottles and containers every month. Downtime becomes a serious problem when it interferes with this large volume production.

"Since Aeroquip Hose and Reusable Fittings last longer we're putting them on all our machines."

reports Jacob Gauger, Superintendent, Forming Department, Diamond Glass Company, Royersford, Pennsylvania

"We find that Aeroquip Hose and Reusable Fittings give us long, dependable service on our bottle forming line. So, whenever I tear down a machine, I always replace the hose lines with Aeroquip Products," says Mr. Gauger.

To meet high operating temperatures, Diamond Glass uses Aeroquip 2807 Hose of Teflon* and ***"super gem"*** Reusable Fittings on bottle forming machines that handle batches of liquid glass. Aeroquip 2807 Hose of Teflon is particularly suited to high ambient temperature conditions and is giving 2 to 3 years of service on this installation—up to 6 times the life of previous hoses used. Aeroquip 1503 Single Wire Braid Hose with Reusable Fittings is used to supply air inside the machines where working temperatures are lower.

The hydraulic lines for gate control on Diamond Glass busy batch mixer also employ Aeroquip 1503. Long lasting Aeroquip Hose and Reusable Fittings help minimize machine downtime, speed line replacement. Bulk hose is merely cut to proper length and fittings applied with common hand tools. There is no waiting for parts; fittings can be used over and over again.

Your Aeroquip Distributor will be glad to demonstrate the features that make Aeroquip the recognized hose line and fitting leader. He is a specialist who knows how to solve fluid line problems. His name and phone number are in the "Yellow Pages" under "Hose."

Teflon is DuPont's trade name for its tetrafluoroethylene resin
"super gem" is an Aeroquip Trademark

Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN

ENGINEERED PLANT SAVINGS

FACTORY
PLANT OPERATIONS
CASE BOOK

Safety mirror
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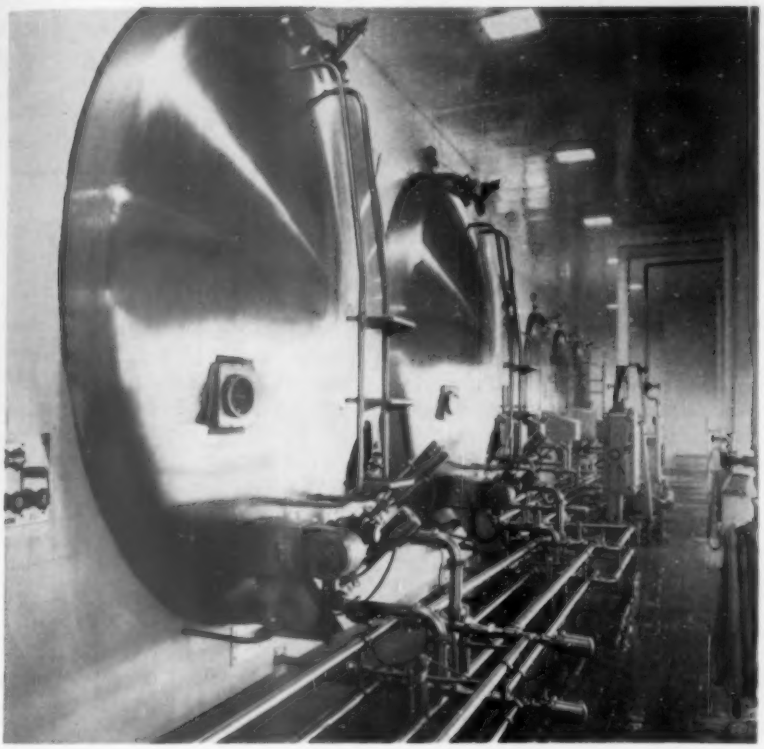

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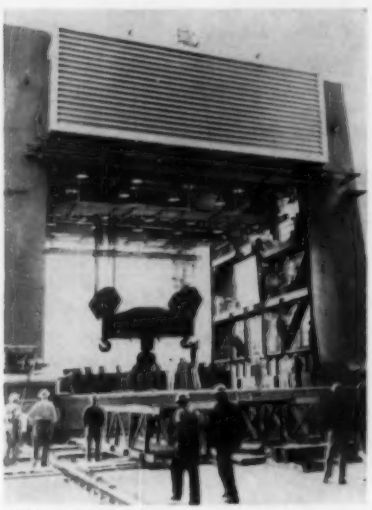

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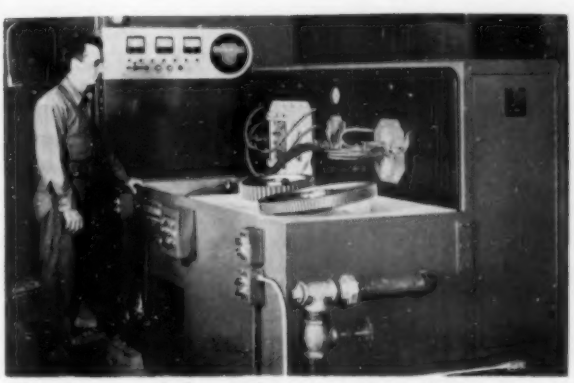

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PLANT OPERATIONS CASE BOOK

NORMAN H. SOLON, EDITOR

No. 41 March 1961

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Multi-job machines mean money

By combining several production jobs on single machines, Bell & Howell Company, Chicago, has slashed direct labor costs. The multi-purpose drilling and chucking machines above are cases in point.

The five-in-one drilling machine (left photo) cuts down on the number of operations required to drill holes in cameras. It drills, taps, bores, reams, and spot-faces. Most holes were formerly drilled one at a time or at best by multi-drill heads on presses. The other operations had to be done separately.

The Wis-Matic machine (Wisconsin Drill Head Company, Butler, Wis.) has chopped the cost of these operations 75% and eliminated 74% of the man-hours.

Up to five power units can be mounted on the machine's base—four horizontally and one vertically. And all of them can work on a single part at the same time. A 27-spindle drill head (not shown in the photo), powered by a 2-hp. motor, can be mounted on the machine.

The chucking machine at the right performs operations that used to be done on a drill press and on hand screw, threading, tapping, and light milling machines. It spot-faces, countersinks, chamfers, centers, taps, eccentric turns, deburrs, counterbores, box tools, threads, and hollow mills. It has really paid off for Bell & Howell by slashing 50% of the former costs of these operations. And it can be fed by unskilled women rather than by highly skilled machinists.

Made by Standard Tool & Manufacturing Company (Lyndhurst, N. J.), the chucking machine consists of five independently driven spindles, each with built-in controls. These set depth, rapid approach and feed rates, and individual raising and lowering mechanisms. The spindles are vertically mounted on keyed columns around a five-position table. Each table contains a mechanical lock pin for positioning, and a separate stop for locating the piece being worked on.

Steam system both heats and cools

A gas-fired boiler heats and cools—summer and winter—the new 70,600-sq.-ft. Fox-Vliet Drug Company plant in Wichita, Kan.

The entire area is air-conditioned

in summer and centrally heated in winter. A low-pressure boiler with SIB rating of 30,360 square feet and net rating of 25,000 square feet provides the steam to operate the absorption unit in the summer and the heating system in the winter. The same pipe system is used for both the chilled and heated water.

The switch from heating to cooling takes just about a half hour. Only four control valves in the boiler room have to be burned (photo). The steam that was available for the absorption unit enters the heat exchanger, thus producing hot water for the heating system.

Spotting electrical gremlins

The electrical system of cars coming off the assembly line gets a final remote-control check by the operator sitting behind the wheel at Ford Motor Company, Detroit. The screen (at right, above) tells the story.

The electronic audit gauger (EAGER) pinpoints malfunctions by checking the electrical system against specified standards. The inspector initiates each test by pressing a button on the remote-control unit in his hand (arrow, left photo above). As the test starts, a 35mm film projector within the gauger displays instructions on a screen visible to the inspector. The film for the instruction has a split frame. The second half, which is invisible, is used to program the EAGER through a series of eyes and dot patterns. This tells the machine what the test is and how to perform it.

The visible half of the screen also has a chart mapping out the acceptable standards for the test. The results of the test are superimposed on this chart, immediately pinpointing any fault. Depending on the reading, the inspector passes or rejects the test by pressing a button on his remote-control unit. Thus, permanent records of any flaws are made on tape.

The gauger can be installed anywhere on a production line. Its folding arm swings out over the car hood. Electrical connections leading from the arm are clamped to the battery and three other terminals.

In this way, the inspector can test electrical components, such as heater, starter, radio, generator and regulator, battery and lights. Even engine speed can be measured.

In a typical test the instructions may read "start engine." The inspector obeys. Then, by comparing the actual meter reading with the standard on the screen, he knows whether or not the starter is operating properly. All rejections are corrected immediately after the test sequence, and then rechecked.

Ford can now check its electrical system in 15 minutes. In the past, two or more hours were required for the same cycle of tests. And the results were less accurate, owing to a lack of controlled standards.

The EAGER (Performance Measurements Company, Detroit) can be adapted directly to check any kind of fully assembled electrical system.

Suits ride the V-belt conveyor

These suits (lower photo) are riding along a new plant-made conveyor at Bobbie Brooks, Inc., Cleveland. The conveyor is made of steel tubing (Republic Steel Corporation, Cleveland) that acts as a channel for a V-type belt. Top photo shows how the belt enters the tubing.

Most plants in the suit manufacturing industry use push-along hangers on steel pipe.

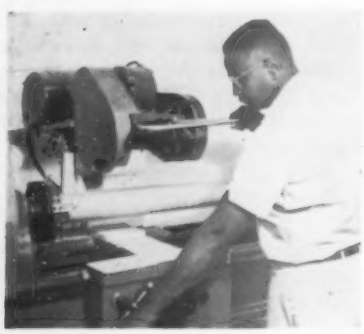
The 5-mile-long conveyor can handle some 60,000 units per day while moving faster than 100 feet per minute. It carries garments from the receiving docks through inspection, to stock and order-filling areas. These operations, which used to take three to six hours, are now done in less than half an hour.

The belt rides on top of the channel to carry the garments, returns inside the tube. This eliminates need for a second support structure for the return line. Since there is no metal-to-metal contact, oiling or greasing is not required. And noise is cut to a minimum.

The conveyor is also used in the warehouse of the plant for automatic order picking. An operator at a control panel pushes buttons corresponding to garment, style, size, color. This releases garments from individual storage rack positions; they slide down to the conveyor which transports them to the accumulation department.

WET BLASTING GIVES LEADS A FAST SCRUBDOWN

This wet blasting cabinet has speeded operations 50% without additional personnel at Melpar, Inc., Falls Church, Va. It cleans leads in printed circuits by hurling water grit at high velocity. Fixtures on the machine grasp the components securely around the center section, completely exposing both leads to the blast gun action. Some 4000 components an hour can be cleaned by this method. The company had formerly tried brushing, wiping, and glass erasing. But all these methods required considerable handling and weren't satisfactory for all types of components. The machine is made by Pressure Blast Manufacturing Company, Manchester, Conn.



Streamlined lathe subs as slitter

Converting a standard lathe to slit rolls of insulation has paid off in a big way at Raytheon Company, Waltham, Mass.

The insulation is used in the manufacture of transformers ranging in size from a 1-in. cube to a 3-ft. cube. This meant that the company had to purchase rolls in a variety of special widths—an expensive proposition from the angles of purchase price and inventory. Also, shortages of one particular size often held up production.

A reconstructed standby lathe has now eliminated these costs. The carriage was built up and a motor-driven blade installed. A stone for automatic honing was fixed beside the blade. Cost: $1200.

The converted slitter cuts standard-sized rolls of insulation to any desired width. And Raytheon saved in the following ways:

- **Elimination of vendor's charge for special widths—$2000 yearly.**
- **Salvage of stock—$1000 yearly.**
- **Reduction of inventory.**
- **Reduction of purchasing procedures and paperwork.**
- **Elimination of downtime due to shortages of insulation.**

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

Taking dead aim at industrial Mata Haris

The Central Intelligence Agency has nothing on American industry. Cloak-and-dagger activity among competitive businesses is neither subtler nor less vicious than that among nations. According to R. J. Boise, security department manager, Ford Motor Company, Detroit, sophisticated industrial spy devices include electronic recorders, hidden cameras, and telephone wire taps.

However, if you're victimized by information leaks, there's a good chance loyal employees are unwittingly cutting your throat. The talkative engineer at a trade confab and the boastful salesman can be as big a threat as the planted spy. Or you yourself may be tipping your hand. Plans for plant sites and special marketing efforts can be revealed by concentration of technical personnel, conspicuous travel, executive management meetings, and extensive proving-ground activities. Boise advises keeping such projects as unobtrusive as possible.

The actual undercover agent is a tough nut to guard against. Here are some precautions Boise recommends to minimize spying activity:

- Investigate employees who will have access to confidential data.
- Be alert to disloyal, irresponsible, or disgruntled employees.
- Promote company loyalty, security awareness, and responsibility.
- Stress repeatedly the importance of keeping statistical information away from unauthorized persons.
- Avoid discussing confidential matters over the telephone or in public places.
- Take additional measures when planning a special project.
- Use a project or code name instead of descriptive terminology if you want to conceal existence of a product from your competition.
- Control the disposal of confidential waste material.
- Instruct security patrols to check locked locations periodically and to pick up material left on desks in open areas.
- Change locks on doors and desks periodically.

To guard against the electronic spy—wire tap or hidden recorder—Boise advises these procedures:

- Be alert to suspicious packages

lying in waiting rooms, lobbies, and washrooms.

- Be suspicious of strangers calling at executive offices and insist on visitor identification and investigation, if necessary.
- Investigate any unusual calls or interruptions.
- Verify the identity of all linemen and utility service men working in executive offices.

Boise made these suggestions at a recent seminar of the American Society for Industrial Security.

Thermoelectric unit does double duty

This 100-watt thermoelectric generator is performing double duty at Northern Illinois Gas Company, Aurora, Ill. It's used for charging batteries and for cathodic protection of pipelines. This is one of the first industrial applications of thermoelectric power.

The unit consists of two 50-watt sections stacked one on top of the other. Propane gas is burned at the base and hot gases pass through a central insulated chimney. Several thermoelectric couples are installed around this chimney and generate electric power from the heat. The hot sides of these couples operate at about 400 C.

The generator (Westinghouse Electric Corporation, Pittsburgh) weighs some 75 pounds and its output is 11 volts at 10 amp., d-c. A static converter operating at about 88% efficiency changes the output to 48 volts at 2.1 amp., d-c.

Black-light test catches flaws

An accident involving rigging equipment used by industrial painters is likely to have fatal consequences. Thus, the testing of such equipment at Olive B. Cannon and Sons, Inc., Philadelphia, is literally a matter of life or death.

Flaws that cannot be detected by conventional means are revealed by a black-light magnetic particle inspection. Here's how it works:

A current is sent through the piece being tested (photos above show a hook). This turns the equipment into a magnet. If there is any flaw, such as a crack in the metal, each section becomes a separate magnet with north and south poles. A liquid detector is then poured over the hook, causing tiny fluorescent particles to line up along flaws in the metal. Under black light (almost ultraviolet) these particles become visible, pinpointing defects.

The faulted items are junked by Cannon, while the approved equipment is painted with an orange band for identification. All items are tested periodically to locate any new flaws that have developed.

Steel mirror checks from bottom up

This stainless steel mirror is a safety device at American Brake Shoe Company, Meadville, Pa. It gives a picture of the core positioning of a machine.

In the past, a worker had to crawl beneath the supporting steel horse to do his checking. Besides being time-consuming, this was a potential accident hazard. In one case, an employee was crushed when the mold supports collapsed.

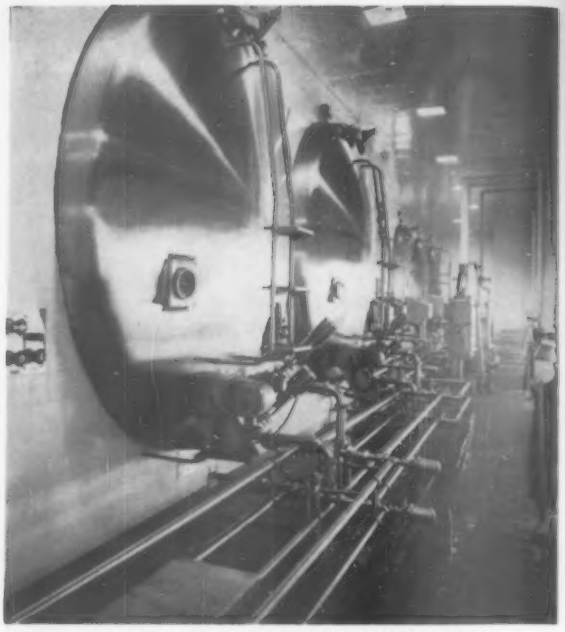
The steel mirror can be readily polished to a highly reflective surface and won't be damaged when splattered by molten metal. It's resistant to wear and abrasion, therefore can't be scratched from falling sand particles. If the mirror gets dirty, soap and water will restore its reflective surface.

Training with sound

A U. S. Army device may set a pattern for industrial training of the future. It's a tank-driving trainer (Transdyne Corporation, Albertson, N. Y.) that simulates the complete driving cycle, including electronically computed sound effects.

The system reproduces sounds of start-up, main engine, auxiliary engine, and transmission in response to manipulation of driver controls. It can also be used to train a machinist in a noisy shop.

THIS PANEL CONTROLS FLOW OF MILK AND . . .



CLEANING SOLUTION THROUGH THESE PIPES.

Milk pipes almost clean themselves

Sanitation is the overriding consideration at Carnation Company's Houston, Tex., plant. Pipes and tanks must be cleaned periodically to meet government standards—which could mean considerable downtime.

Now, however, all pipes are quickly cleaned in place—by the push of a button—at the end of each shift. It's done by circulating cleaning solution and water over all surfaces that come in contact with the product (milk).

This cleaning process used to be a major operation—all pipe systems had to be disassembled, scrubbed by hand, then reassembled.

Key to the clean-in-place (CIP) system is a central electro-mechanical control panel (shown in left photo above). One operator directs the flow of milk out of the areas to be cleaned, then starts the CIP. Handling of the milk is programed by selecting the proper switches to route it through the desired pattern. The flow is directed by remote-controlled air-operated valves.

A rotating drum timer controlled by a selector switch programs three separate cleaning patterns—for raw milk lines, pasteurized milk lines,

IT'S KEYED TO SAFETY.

and jacketed milk storage tanks. It then sounds a bell, which signals the operator to push the start button. This circulates chlorine and detergent cleaning solutions and hot water through the system. After each solution has been circulated for a pre-set period, the system is air-blown—then rinsed with water and air-blown again.

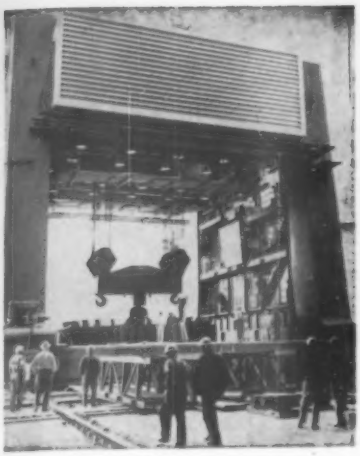
Just before the morning shift starts, the floor foreman again sanitizes the pipelines with a chlorinated solution. To actuate this special cycle he must unlock two separate switches on the control panel.

There are two safety checks on the system:

The first check eliminates the possibility of mixing cleaning solution and milk. Before the cleaning solution can be sent through the system, the operator must get the key to unlock a handle that protects the pipe connection leading to the tank. The key is welded to the tank's sample cock plug. It's obtainable only by opening the door and removing the plug from the sample cock from the inside. If there is still milk in the tank, the operator who gets a jet of liquid in his face will be the only casualty.

The second check is the control panel itself. The gauge in the small photo (center) indicates the liquid level of each of the seven tanks. If a tank comes close to overflowing, a bell rings. The panel also indicates which of the eight CIP steps is in operation.

Payoff: Bacterial swab tests indicate the count is considerably below the U. S. Public Health Code requirements of 100 colonies per 8 square inches—and frequently as low as 0 count. This near-aseptic condition means increased shelf life and better quality of product.

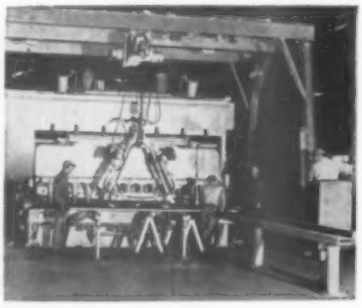


Largest gantry crane can lift 700 tons

This 900-ton gantry crane—the world's largest—handles 590-lb. rotors with a precise touch at the Niagara Power Project, Niagara Falls, N. Y. It can lift loads weighing over 700 tons.

The seven-story-high crane lowers the giant (35-ft.-dia.) rotor into a pit-mounted stator that provides only a 5/8-in. clearance in all directions. It also has to position the wheel to engage a keyway, at the same time lining up 24 shear pins with mating holes in the stator frame.

The mammoth crane is made by Milwaukee Crane Division (Cudahy, Wis.), Novo Industrial Corporation.



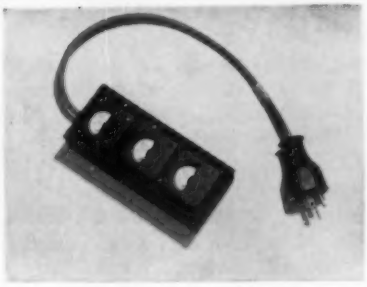
Vacuum lift has arms that fold

Stainless steel plates of all sizes are carried to the shearing operation by this versatile vacuum lift and semi-gantry at Jessop Steel Company, Washington, Pa. Fold-up hinged arms take care of any variation in sizes of the plates.

The self-contained unit has integral wiring and power, traverse mechanism, braking, control panel, hoist, and powered trolley. And it has a lift capacity of 4000 pounds.

The vacuum power source is attached to the monorail on the gantry. All movements of the unit are controlled by a single operator from a cab mounted on the gantry.

The unit is made by Vac-U-Lift Company (Salem, Ill.), Division of Siegler Corporation.



Miniature meter monitors outlets

An improved polarity tester for 115-volt, 3-wire, single-phase grounded convenience outlets has been developed by E. I. duPont de Nemours & Company for use in its Penns Grove, N. J., plant.

In the past, three pilot lights on the plug-in tester burned bright or dim to show whether polarity and connections were correct. If they weren't, the combination of bright and dim lights indicated where the fault lay. The trouble was the tester could be misread—dim lights mistaken for bright.

Miniature a-c voltmeters (0 to 150 volts) have now been substituted for the pilot lights. This gives the company a more definite indication of correct polarity or open connections, and at the same time checks on line voltages.

The case is a simple piece of Wiremold gutter (Wiremold Company, Hartford, Conn.) and cover with blank end fittings.

Pasted on the back of each tester is a code chart. This shows whether the combination of voltmeter readings indicates a correct or faulty receptacle hook-up. If it's faulty, the trouble shooter can compare the chart with his meter readings to find out where the fault lies.

The materials for each tester cost about $15.

Source: W. F. Lippincott, Engineering Department, Chambers Works, E. I. duPont de Nemours & Company, Penns Grove, N. J.

Aid to education

A dollar-for-dollar matching contribution plan has been set up by McGraw-Hill Publishing Company, New York, as an aid to higher education. Under the program the company will match—up to $500—any employee's gift to his alma mater.

All non-profit-making accredited institutions of higher learning are eligible. This includes junior colleges and technical institutions, as well as senior colleges and universities. However, the company's gift to any one institution is limited to $1000 in a calendar year.

Leave soiled clothes, pick up clean ones

That's all there is to it with these lockers at B. F. Goodrich Company, Avon Lake, Ohio. Workers are assigned special steel lockers in addition to their regular lockers. The laundry picks up soiled work clothes from the locker, dispenses clean ones in return.

This rids plant personnel of the nuisance job of sorting clothes. It also eliminates wasted man-hours spent waiting to exchange uniforms.

Laundry costs are no higher than before. The laundry supplies the lockers on a loan basis.

YOU BE THE ARBITRATOR

THE CASE OF

The weary worker

Out of the experience of the American Arbitration Association

Management of a manufacturing company asked for—and the union agreed to—a cost-reduction program that included combining certain jobs. As a result, a job previously known as "lift-truck operator" became "lift-truck and bailer operator." And the men who held those jobs were required to do more manual handling of materials.

This put Ed R. in an awkward spot. He had formerly been a machinist but had asked for a transfer to lift-truck operator, at a lower rate of pay, because he was getting on in years and wanted work that wouldn't be as tiring. Now, because of the change, he was worse off. He asked to be returned to the machine shop.

"The new job requirements apply to you just as to everyone else," explained the plant manager. "If you want to go back to the machine shop, we'll keep you in mind for the next opening. But you can't bump your way back. Meanwhile, you have to do your present job."

But Ed believed he had a right to bump, so he filed a grievance.

Eventually the case went to arbitration. Suppose you were the arbitrator? How would you rule?

For the actual decision turn to page 172

EIGHT-FACED WAITERS SERVE GERMAN WORKERS

Vending machines are no American monopoly. Octagonal snack centers—equipped with coin changers—provide an in-plant mechanical delicatessen for workers at the Volkswagen plant in Hanover, West Germany. The center serves hot and cold drinks, candy, pastry, fresh fruit, sandwiches, sliced meats, and cheese. It's easy to service. One door (left) gives the vendor access to all the vending machines.

Computer works out formula for steel

An electronic computer dishes up the proper formula for producing steel in a basic oxygen furnace at Jones & Laughlin Steel Corporation's Aliquippa, Pa., plant. The computer calculates the correct ratio of scrap to hot metal and lime that must be charged into a furnace so that any type of steel can be tapped at a designated temperature.

Operators used to rely entirely on their experience in figuring how much scrap was needed to give a desired tapping temperature. This was only a hit-and-miss proposition at best. If the finishing temperature were outside the specified range, the molten steel had to be either reblown for more heat or cooled by the further addition of scrap. In both cases, of course, valuable production time was wasted.

The analog computer (Electronics Associates, Inc.) Long Branch, N. J., can give the correct formula in five seconds. Variables, such as the desired charge weight and tap temperature, are fed into the computer by dials. Then a pushbutton sends the computer into action.

Long-distance quiz

Employees at key work centers throughout Lockheed Aircraft Company's Burbank, Calif., plant can quiz a computer without moving from their stations. They simply type a question on a standard four-bank Teletype device that resembles an ordinary typewriter.

RAMAC (International Business Machine Corporation, New York) gets the query by remote control and provides the answer in computer code. The code is routed through a

machine that translates it into standard telegraphic code and automatically causes a five-channel paper tape to be punched. The tape is then transmitted back to the station originating the inquiry.

The system is being used by Lockheed to provide up-to-the-minute job-status information, such as inventory data, to widely scattered personnel throughout the plant. About 800 job-status inquiries per day are made by employees.

The remote communication system is manufactured by TelAutograph Corporation, Los Angeles.

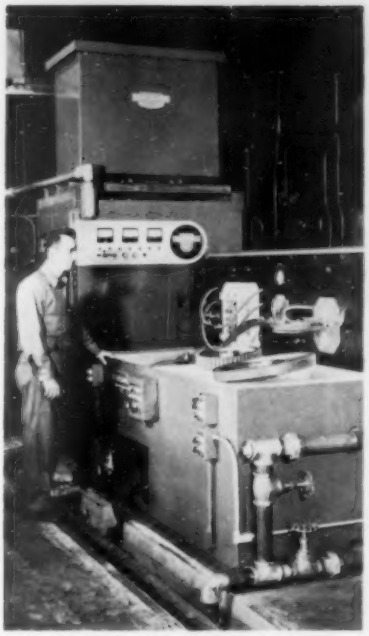
Childproof fence

There's no danger of children poking steel rods, such as fishing poles, through the fence surrounding the transformer station at Peter Cooper Corporation, Chicago. Galvanized steel strips insure that youngsters won't electrocute themselves in this fashion.

The strips, which can be installed on existing fences, can also be used as a screen to cover up either rubbish or confidential equipment around your plant.

The tight-laced fencing is made by Anchor Fence Division (Chicago) of Anchor Post Products, Inc.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.



Induction heating at broadcast frequency

This versatile induction heat-treating machine works in two frequency ranges at Bennett Heat Treating Company, Newark, N. J. The 50-kw. machine can operate interchangeably from 200 to 450 kilocycles and 5 to 10 megacycles.

Heat can be delivered at any rate and depth desired—from skin hardening to deep heat treating. During tests, heating cycles were so short it was necessary to use a special heat timer with sensitivity of 1/100 of a second. In the case of extremely fine-tooth gears, the hardening temperature was reached in only 1/5 of a second. The gears were handled on a production-run basis at 7500 kilocycles in complete safety.

With the new machine, oil or water quenching is not always necessary because the rapid heating of the gears brings them swiftly to full hardness. Only the surface of the gears is heated. As a result, the remaining cold metal causes the parts to chill so rapidly they become self-quenching. This phenomenon could have considerable value in hardening parts that require ultra-precise dimensions throughout the heating process.

The machine was designed and built by Induction Heating Corporation, Brooklyn, N. Y.

CASE BOOK CAPSULES

No pedals in the trucks of tomorrow—that's the word from Bendix Corp., Detroit. Instead, the floor board will be divided into two segments, one for breaking, the other for acceleration.

National spending for research will rise from the current $60-billion to $200-billion in the next nine years, says Arthur D. Little, Inc., Cambridge, Mass.

A 10,000-man industrial payroll was processed in 2¼ minutes via a new electronic data processing system at Minneapolis-Honeywell Regulator Co., Minneapolis.

Some 11,350 persons died and $1½-billion in property was destroyed last year in fires, according to figures issued by the National Fire Protection Assn., Boston.

High-speed stereo camera and projection system is being developed for the Navy by Benson-Lehner Corp., Santa Monica, Calif. Designed for testing, the 3-D camera can stretch one second of action into eight minutes of viewing time.

Selective plating process, developed by Selectrons, Ltd., New York, permits the deposit of many metals and alloys on almost any conductive basis material. Thickness can be precisely controlled and limited only to areas where the plate metal is actually needed.

Silicon may be used to store heat energy collected from the sun in the near future. Under a government contract, General Electric Co., Philadelphia, is now exploring this possibility for producing electrical power in satellites. Biggest drawback: Silicon fuses too easily with other materials when used at high temperatures.

Fifth annual seminar on Industrial Mutual Aid and Disaster Control will be held Apr. 18-20 in Houston, Tex. Cooperative utilization of equipment and manpower for disaster prevention and control will be main subjects discussed.

20,000-TON PRESS BUILT BY PLANT IN SIX MONTHS

This giant multiple ram-forging press is producing extrusions up to 30 feet long and 56 inches in diameter at Cameron Iron Works, Inc., Houston, Tex. It was built on the spot in less than six months under in-plant engineering and supervision, working from a wooden model without drawings. Jaws of the monster press can open 15 feet. The main rams exert a force of 20,000 tons and the side rams 7500 tons each.

TV puts eye right inside pipe

Closed-circuit television is scanning the insides of pipelines for National Power Rodding Corporation, Chicago. This permits visual checking of pipes that could not be inspected before because of small size, location, or safety factors.

The system uses a videcon tube (Radio Corporation of America, New York) and a preamplifier enclosed in a waterproof steel shell 18 inches long, 5 inches in diameter. A high-speed, wide-angle lens scans a 45-deg. acceptance angle.

The 17-in. monitor screen and controls (General Precision Industries, Pleasantville, N. Y.) are connected to the camera by a 24-wire waterproof cable.

The camera is mounted on skids or rollers, depending upon type of pipe being inspected. Two 600-watt photoflood lamps alongside provide necessary illumination. Camera and connecting cable are pulled through the pipe by other steel cable.

Still camera photos of the monitor screen give company engineers a permanent record to work with.

Paperboard takes plenty of punishment

Lightweight but rugged, corrugated cartons have replaced bulky wooden crates at Sola Electric Company, Elk Grove, Ill. And they can take plenty of punishment. The paperboard packages are used to ship electronic equipment weighing more than 600 pounds.

Special high-humidity board used to construct the corrugated container has one-third greater strength than conventional board. Each carton can hold weights up to 1 ton. Cartons can safely be stacked three-high in storage.

Payoff: The lighter carton, through an over-all weight reduction, has reduced shipping costs. And has eliminated man-hours formerly spent in constructing wooden crates.

Hanging out the crying towel

Personnel functions go beyond the production line and into the home at S. W. Farber, Inc., Bronx, N. Y. The company's personnel office is open before 8 a.m. and during the lunch hour to hear the personal and emotional problems of its workers. In addition, the personnel director is available at all other times whether he's in his office or on the plant floor.

Most of these problems, of course, involve the need for cash, and employee loans up to $40 are easily made. Larger sums are given when necessary. Not all of these loans are for emergency purposes. A large one, for instance, was made to purchase a piano for the gifted son of an employee. Repayment of loans is made in cash on pay day.

Jack Walker, personnel director of the company, outlined details of the program at a recent conference of the American Society for Personnel Administration.

TRAINING JANITORS IN CLASSROOMS . . .

AND ON THE JOB.

Getting the most from your custodial dollar

Men, not materials, are the biggest factor in getting a hundred cents out of your housekeeping dollar. A survey conducted at General Electric Company's Richland, Wash., plant, prior to a revamping of its janitorial system, brought out these facts about its operation:

- Direct labor comprised the vast majority of housekeeping costs. There are 33 janitors and two foremen. Materials and equipment costs were almost incidental; in some cases, these actually had to be increased to provide an over-all reduction in costs.
- It's wasteful to shift work from skilled janitors to higher-paid production workers in an area.
- The key to any reduction in cost would have to be the increased productivity of the individual janitor.

Using these conclusions as a base, G-E instituted a four-phase "work-smarter-not-harder" program to slash costs and improve the quality of its janitorial services.

The janitors themselves were called on for advice in all phases of the program and this resulted in a marked increase in morale. It made them feel they were part of the team—not just flunkies.

Here are the four steps of the program:

1. Choosing materials and equipment

Distributors of sanitation supplies were asked to demonstrate their products. Small quantities were purchased and tested under the supervision of housekeeping foremen. Individual janitors were queried and their advice asked on the effectiveness of each product. On the basis of their reports, a single cleaner was chosen for each department, instead of several as in the past. Standardization of supplies serves the double purpose of reducing inventories and simplifying work. Arrangements were made to assure deliveries at desired times.

2. Standardizing methods

In most cases, the vendor specifies the proper method of using supplies. G-E's problem was to communicate this information to custodial personnel. This was done through a series of formal classes, conducted by the company's training department. In some cases, the manufacturers' representatives conducted training sessions, demonstrating the use of their products.

Printed manuals supplemented lectures. Each student received booklets on standard cleaning methods and on the correct use of sanitation supplies. Each one was encouraged to offer methods improvement suggestions. Accepted ideas were made part of the course.

As a prestige factor, achievement certificates were signed by the janitors' foremen and distributed in a formal ceremony at the completion of the course.

These classes were repeated as major changes in personnel, equipment, or materials occurred.

3. Setting time standards

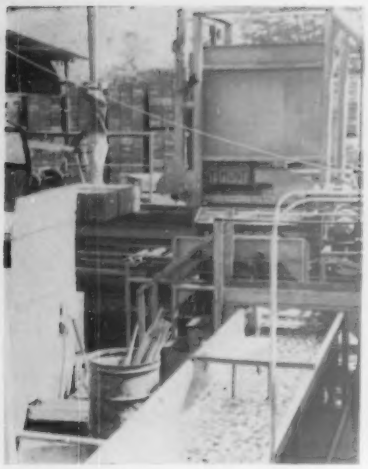
Levels of cleanliness for all sections of the plant were reviewed and altered when needed. Time standards developed by Nationwide Insurance Company, Columbus, Ohio, were adopted, and additional standards were devised at the plant. With these data, the hours of work required for each janitorial run were calculated for maximum efficiency and equalized work loads.

4. Increasing janitorial prestige

The idea that the janitor is a skilled worker doing an important job was stressed throughout the program. Promotional opportunities were discussed with individual janitors. Night-college student workers wishing to attend day sessions were allowed to transfer to the janitorial staff, so their working hours would not interfere with classes.

Through the media of plant publications, the rest of the organization was kept informed about the work being done by the janitors.

PAYOFF: A much cleaner plant and a saving of about $23,448 annually—12% of the plant's operation. Cost of cleaning the plant is now $0.492 per square foot.



Water gives fruits a gentle ride

Water controlled to just the right velocity gives peeled fruits a gentle ride through the processing line to canning at Hunt Foods, Inc., Hayward, Calif.

Conveyor belts, forced air, and bucket chains were formerly used to pass items through processing. But the delicate fruits were all too often damaged in transit. Now water conveys the fruits, at the same time protecting them from damage.

Cherries, for example, move to the cans by water, climbing up to the grading table by pumps (Fairbanks, Morse Division of Fairbanks Whitney Corporation, Chicago), and descending by gravity flow.

YOU BE THE ARBITRATOR

(Continued from page 168)

The award: The arbitrator said that when the union went along with the cost reduction program, it had agreed to the combining of certain jobs. But there was no general waiver of employees' rights all along the line. Employees whose jobs were abolished still had the right to assert their seniority and bump into departments where they had once worked. Ed had transferred to the fork-lift job, at a reduction in pay, because the work was lighter. Thus, it amounted to an abolition of his job when extra duties, involving physical exertion, were added to the operation. The arbitrator therefore ruled that the company must return Ed without delay to the machine shop as he had requested.

Caution: The award in this case is not an indication of how other arbitrators might rule in apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Room within a room catches all noise

A newly constructed sound laboratory at Allis-Chalmers Manufacturing Company, Norwood, Ohio, shuts off all outside noise, but catches the slightest inside sound.

The lab is used for testing the noise level of a-c motors up to 900 hp. and d-c motors up to 300 hp. Provision has been made for testing pumps in the future.

The lab cuts out all outside noise with a 6-in. wall sandwich of air between two slabs of 8-in. concrete. Slabs rest on separate foundations to isolate external vibrations. To eliminate standing waves, the inner room has skewed walls.

The inner room is a reverberant sound chamber designed to catch and hold the slightest noise. The concrete walls are heavily painted and their contours designed for maximum reverberations.

A mounting pad in the center of the chamber is constructed of concrete and steel on a bed of sand and is isolated from the main floor (photo). A difference of 40 to 50 decibels between outside and inside noise levels can be obtained with this lab construction.

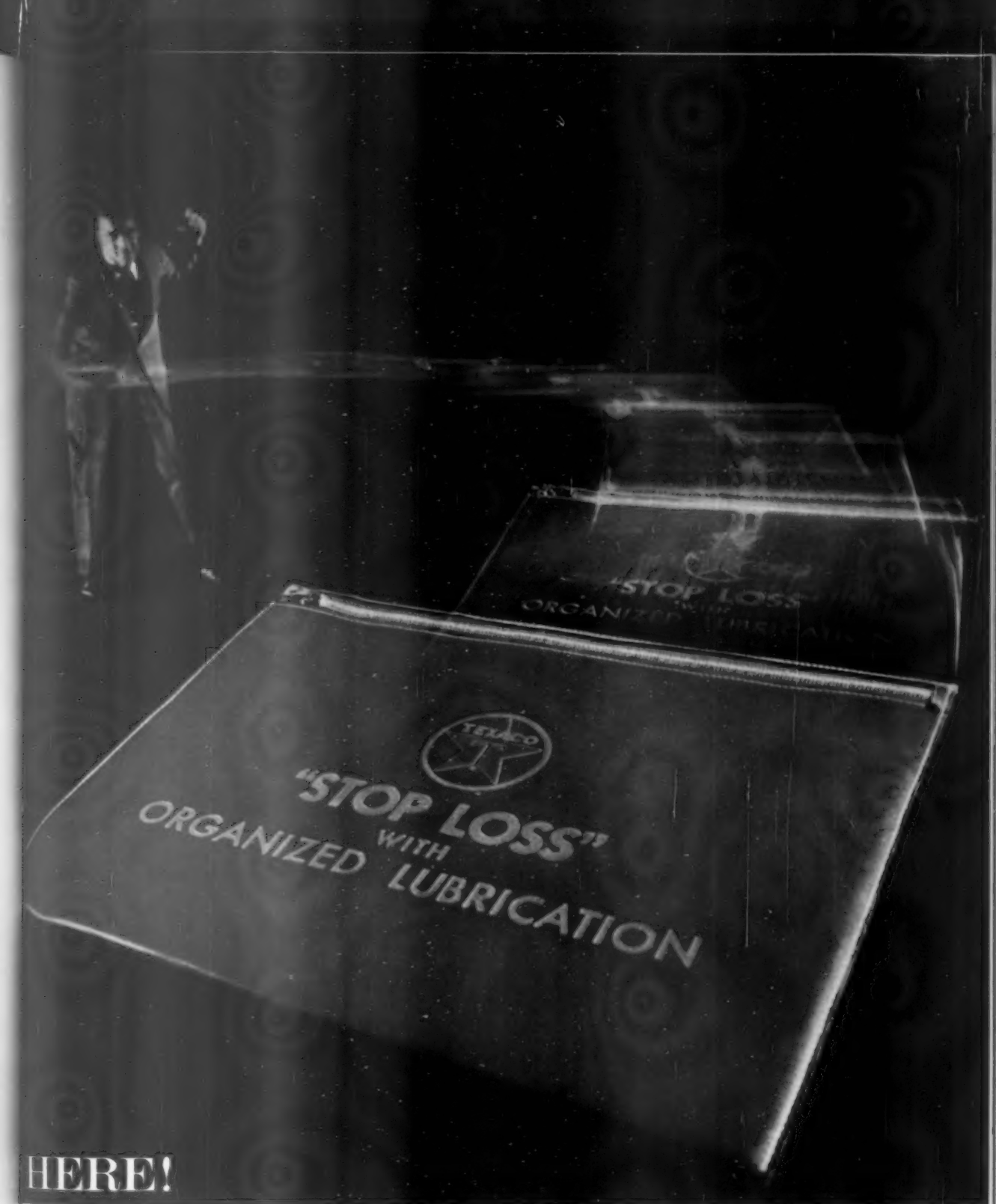
COMING NEXT MONTH

Plant-made machines have made a big difference in efficiency at Universal Form Clamp. They have boosted production without requiring large capital outlay. And any of them can be adapted to your needs.

Separating the MGs from the Caddies

By making allowances for the small-car boom, Lockheed Aircraft Company's Marietta, Ga., plant has increased its parking-lot capacity. The gimmick: separating the midgets from the conventional-sized autos.

The company now reserves a whole lane of spaces for small cars. It found that 43 midgets fitted into an area that formerly packed 28 large cars. Maximum sizes permitted: 5-ft. 2-in. widths, 15-ft. lengths.



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Caught in a profit squeeze? The contents of the Texaco man's briefcase can help you do something about it. Inside is Texaco's "Stop Loss" Program. It's a new cost control tool that can knock as much as 15% off your maintenance costs by showing you how to organize your lubrication. You can tack this saving directly onto profit—for an average 4% net gain. It will pay you to get the details. Write for our folder "How to Starve a Scrap Pile." **TEXACO** INC., 135 East 42nd Street, New York 17, N. Y. Dept. F-180

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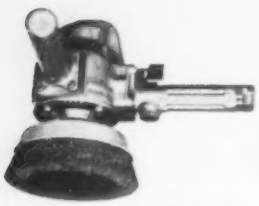
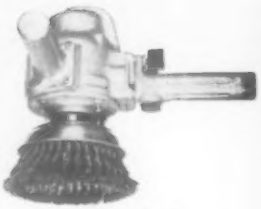


Vertical Grinders



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Screwdrivers

Nutrunners

Impact Wrenches

Die Grinders

Horizontal Wire Brush Machines

Scalers

Scalers

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Riveters

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For more facts circle 481 on Reader Service Card

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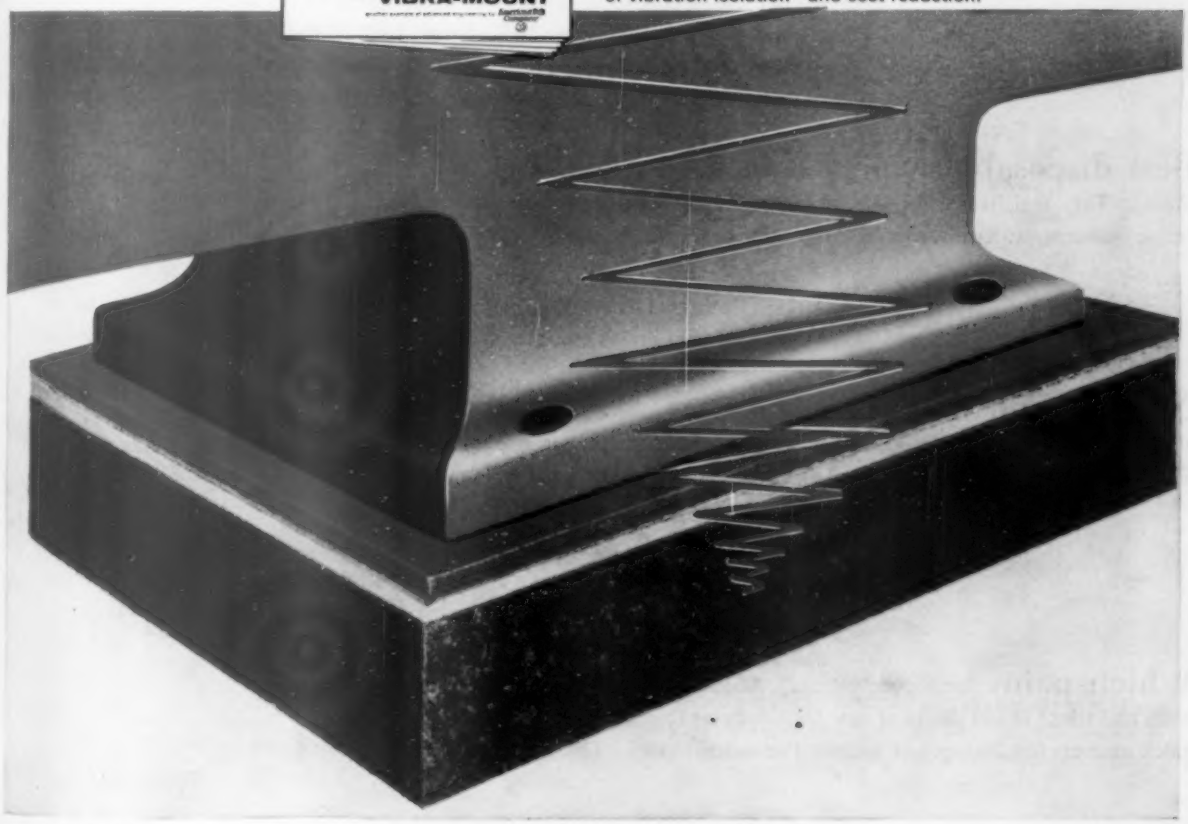

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor, FACTORY

(For more information, circle item numbers on Reader Service Card next to back cover)

Information Searching is new electronic system (*American Society for Metals*) of combing metallurgical and related literature for specific information, delivering digests to subscribers every two weeks. **(236)**

Tile-Cote is activated epoxy coating (*Wilbur & Williams*) that gives you odorless, tasteless, non-toxic surfacing. Applies like paint, yet approaches hardness and durability of glazed ceramic tile. **(237)**

Looking for homestudy training service in industrial supervision and executive management? "Getting Ahead in Industry," a 48-page manual (*Lincoln Extension Institute*), describes accredited program prepared by select group of industry experts. Manual is free, of course. **(238)**

Booklet of the Month may be a year old, but it's our choice because its case studies show how productive maintenance record systems with visible signal controls (*Acme*) can prevent breakdowns. **(239)**

TCL stands for total cost of lighting—fluorescent, that is. Slide chart (*Sylvania*) shows how to estimate your own TCL (breaks down something like this: power 70%, maintenance 20%, lamps 10%). Booklet demonstrates lamp performance is clue to best lamp buy—i.e., best lamp for you is lamp that gives most light, stays brightest longest, needs fewest single replacements. **(240)**

Best disposable wipers we've seen are Kimtowels (*Kimberly-Clark*). They feel like cloth. Act like it, too. Lab tests show they absorb oil, grease, solvents, water three times faster than average cloth towels or rags. **(241)**

Tool-steel identifier is sliderule guide (*Universal Cyclops*) to more than 600 tool-steel brand names and AISI types. **(242)**

No spills, no waste when you dispense liquids from 5- or 6-gal. pails with new pump (*Multi-Meter*) that doles out exactly 4 oz. per stroke. Bigger pump for 15-, 30-, 55-gal. drums delivers 8 oz. per stroke. **(243)**

Pallet users should be happy to hear about Gibraltar, the welded-steel and wood pallet (*Flow Products*) that's billed as "strongest ever built" and offering lowest per-use cost. Reason: welded-wire and dowel fastenings. **(244)**

Which paint for copper gutters? Acoustical tile and plaster? Masonry walls and trim? Twirl wheel of new Dial-A-Paint selector unit (*Luminall*) to get quick answers for 29 types of interior and exterior jobs. **(245)**

Turn the page

J & L NEWSLETTER—

the man who needs a new machine tool is already paying for it

HERE'S SOMETHING YOU MAY NOT KNOW

For over 40 years Jones & Lamson Machine Company has been designing and manufacturing the optical systems used in J & L Optical Comparators. Why? Because they must have specifically designed projection and condensing lenses with specifications not found in other types --- or adaptations of other types --- of lenses.
Write for LO-6013.

NON-MACHINING CYCLE TIME DECREASED 70%

The hex turret of J & L's new Automatic Turret Lathe indexes automatically on an average of about 1 second per station. That's fast! And that's not all. Fast motion for the saddle is 500" per minute. Combine this kind of machine motion speed with unique J & L Push-Button Programming and you've really "got it made"!
Write for GL-6020.

REORDERS FROM THE FILES

All machine operations for J & L Model 30 Automatic Tracing and Turning Lathes are printed on standard cards. Operator merely sets graduated dog rings on conveniently located control drum to match card. For reorder operator merely pulls card from file. Increase in productivity makes both long and short runs more profitable.
Write for LO-6021.

NOTHING MYSTERIOUS ABOUT TAPE CONTROL

It's a fact! The coding and preparation of tapes is extremely simple. For example, the J & L Tape Control Turret Lathes and Positioning Tables use the word address system. Alphabetical abbreviations, numbers and actual decimal dimensions are typed in and --- out comes the punched tape. Here's one line of code for a machine command: The code typed is Y 16 9.001. This means Y for cross-slide, 16 for spindle speed #16 (which is 512 RPM) and 9.001 for the point to which the cross-slide is to travel. In other words, the tooling on the cross-slide will advance to point 9.001" at a spindle speed of 512 RPM. You could do it yourself!
Write for "Tape Control".

HIGH PRODUCTION NOW ... LOW COST LATER

You can lease any machine in the broad, advanced J & L line right now. No deposit. No down payment. An hourly rate of $2.50 per $20,000 machine value puts J & L Profitivity(R) into your plant. Plan applies to special tooling, fixtures, and original perishable tools ... may even include machines made by other manufacturers.
Write for LO-6002.

TAKING THE TASK OUT OF THREAD CHASING

J & L's new Auto Threader provides a fully automatic thread chasing cycle for single point tool. Concentricity is assured between threads and other lathe work performed in the same chucking. Available with all J & L Turret Lathes.
Write for CO-5913.

J&L® JONES & LAMSON MACHINE COMPANY
505 Clinton Street, Springfield, Vermont, U.S.A.

Chemistry for the Safety Man is just-issued primer (*U. S. Dept. of Labor*) designed to help him (and others) understand hazards presented by commonly used materials. Sample copies of this bulletin, second in environmental and chemical hazards series, free so long as supply lasts. **(246)**

For maple flooring enthusiasts, revised list of lab-tested and approved floor finishing products (*Maple Flooring Mfrs. Assn.*). Also informative folder on finishing northern hard maple the MFMA way. **(247)**

50 Plus makes its debut on newsstands this month. It's "the magazine for successful retirement" (*Plus Publications*) and quite possibly the magazine you (or your company's personnel director) have been looking for—being as how it's keyed to needs and interests of people who are 50 or older. Available in bulk for distribution to tomorrow's retirees. **(248)**

Non-financial executives need no longer handicap themselves by operating without basic financial know-how every executive must have. They can attend one of five seminars (*American Management Assn.*) in fundamentals of finance and accounting scheduled for March, April, May, June. **(249)**

Machinists soon learn combination tool (*Kelm*) beats stick of file or air hose for removing chips from T-slotted tables. T-end cleans channels; other end spoons out chips; brush wipes away left-overs. **(250)**

Thing you'll like about newest safety ladder (*Columbia*): User can fold back steps he's not using, stand on wide platform with weight in center of ladder and both hands free for productive activity. **(251)**

Hunting for speakers on labor relations topics? See "Let's Talk About Labor" (*U. S. Chamber of Commerce*). Gives names and addresses of 47 specialists in labor-management problems and legislation who are able and willing to speak at conventions, meetings, luncheon sessions. **(252)**

PM fans will get bang, also smart ideas, out of booklet (*Addressograph*) that describes typical preventive maintenance systems. **(253)**

Hot water for industrial plants is 100-page manual (*A. O. Smith*) full of cost-saving ideas for your maintenance department. **(254)**

Sunlight without glare? Sure thing. With Shade (*Transeal*). It's Krene vinyl sheeting in colors from filtered white to olive green transparent. Three of the colors also absorb heat. Shade comes cut to window size. To apply, wet pane, press Shade against it, squeegee excess water. **(255)**

Windowstep is tubular steel scaffold (*Newark Ladder*) that hooks over sill, provides 11x21-in. working platform. Weighs only 9 lb., supports up to 60 times its weight. Built-in guardrail. Rubber bumpers. **(256)**

Turn the page

In the palm of your hand
one machine... 79 cost-cutting uses!

THE TORNADO 400 SERIES VACUUM is the *one* big-power maintenance tool that never wastes a minute . . . applies itself to 79 basic jobs. Whether it's vacuuming dirt or metal chips, cleaning a boiler, performing wet pick-up of any solution or working as a portable cleaner, blower or sprayer, the TORNADO 400 works with speed and efficiency. From super-speed air intake and filtering to removable, self contained motor, here is quality that *purrs*, quality that pays substantial on-the-job dividends. A small investment for the *big* job it does—let us prove it!

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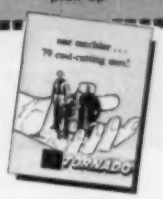

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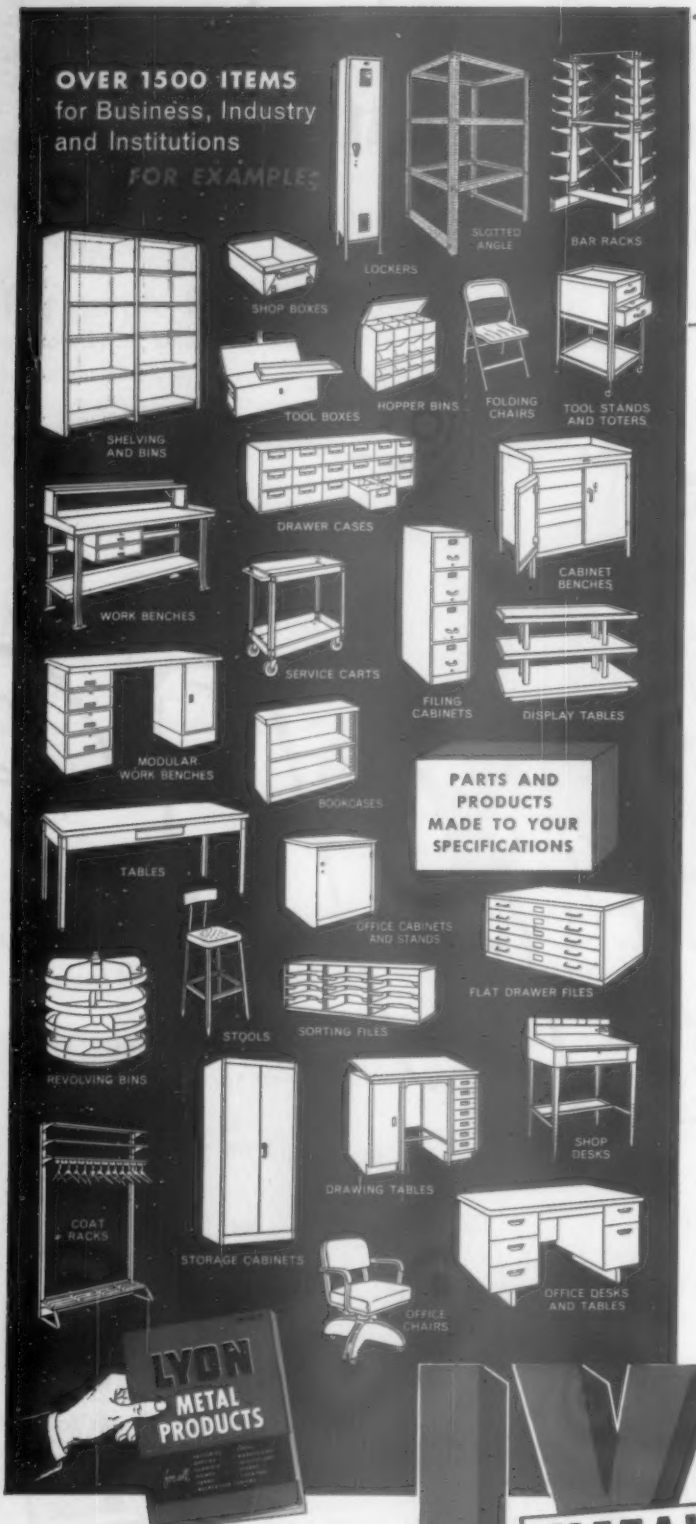
For more facts Circle 483 on Reader Service Card



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Steel-strap sealing is sure as shootin' with Microgrip (*Signode*). Seems high-friction mastic compound coats inside surface of crimping area. When crimps are applied, mastic "bites through" slippery strap coating to provide strong frictional bond between metal surfaces. **(257)**

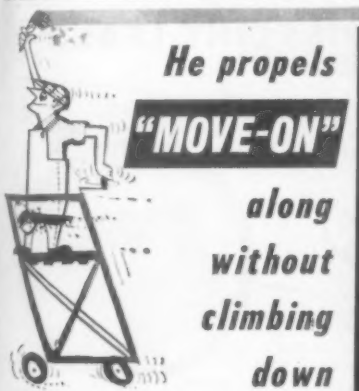
New sound survey meter (*Korfund*) is vest-pocket size, weighs only 1 lb., indicates sound-pressure levels from 40 to 125 decibels on large, legible scale. Can also be used as vibration meter. **(258)**

Modular small-parts conveyor (*Products for Industry*) comes in widths from 2 to 6 in., can be adapted to any bench layout. **(259)**

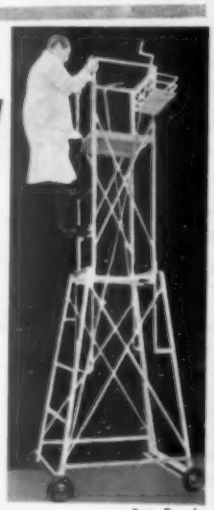
Hydraulic maintenance sets (*Owatonna*) make easy, safe work out of practically any ole pullin' job—like removing (or installing) gears, bearings, sheaves, shafts, couplings, sprockets, pulleys, wheels. **(260)**

Thanks to Perfectype, your secretary can now correct typewritten mistakes without erasures—and in quick time. All she has to do is back-pedal to mistake, insert Perfectype strip (*Perry-Sherwood*), repeat incorrect letter. Special coating "whites out" error, leaves blank space in its place. **(261)**

Turn the page



He propels "MOVE-ON" along without climbing down



As soon as the man on the platform has finished one job, he can WITHOUT CLIMBING DOWN, propel "MOVE-ON" to the next, no matter whether it is in front, behind, or even around a corner. Ideal and economically priced for decorators, electricians, cleaning and maintenance men and all other overhead workers.

Pat. Pend.
SELF-PROPELLED STAGING
For quicker, safer, cheaper overhead work

Two Models Are Available:
MODEL "B" (Illustrated) gives working heights up to 16 ft.
MODEL "A" gives working heights up to 11 ft.

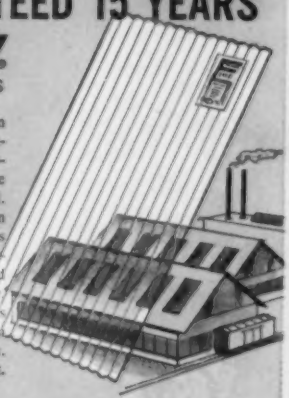
***WRITE** for further information and name of nearest dealer*

ANDERSTON CLYDE, INC.
DEPT. C—P.O. BOX 763
METAIRIE, LOUISIANA

For more facts Circle 485 on Reader Service Card

Skylighting—Sidelighting—Glazing
NOW GUARANTEED 15 YEARS
WITH SUPER **FILON**
the Filoplated® fiberglass panels

Now, greater maintenance savings than ever before possible! FILON's new, exclusive FILOPLATED Panels are produced with a super-tough, armor-like surface on both sides of the panel. Proved so much more durable than other panels, only FILON can offer this amazing Guarantee: FILOPLATED Panels are guaranteed to maintain good surface appearance, good color stability and good light transmitting properties for 15 years, plus the added protection of a Structural Lifetime Guarantee. Written guarantee available on request.



IMPORTANT!
"FILON Facts For Industry". Free kit complete with vital information about FILOPLATED FILON and ROLOLITE; includes test and technical data. Write FILON, 333 N. Van Ness Ave., Hawthorne 87, Calif. Also consult Sweet's Industrial Construction File, 9h/Fi

The Translucent Corrugated Fiberglass Panel in 50 ft. Rolls. Rolls on . . . saves time, labor and money. Eliminates overlap. No cutting waste. Translucent daylighting colors.

FILON PLASTICS CORP.
LOS ANGELES • NEW YORK • CHICAGO • ATLANTA
SAN FRANCISCO • DALLAS • PHILADELPHIA
PITTSBURGH • INDIANAPOLIS • SEATTLE • BOSTON

For more facts Circle 486 on Reader Service Card

IDEAS OF THE MONTH . . . *Begins on page 176*
(For more information, circle item numbers on Reader Service Card next to back cover)

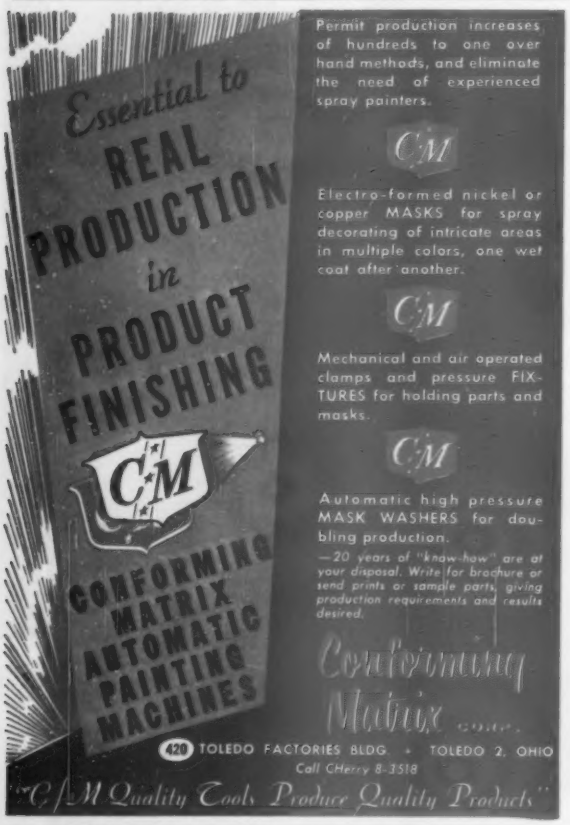
Staffing a new plant? See 10-page booklet (*Executive Manpower Corp.*) which tells how "personnel structuring," new concept in management recruitment, can be staggered to provide executives, specialists, and all other personnel to fit needs as plant builds up to full production. **(262)**

Can Ram can lick your can-disposal problem. It's a new pushbutton crusher (*Milwaukee Metal Products*) that can flatten heavy-gauge 5-gal. cans so flat you can fit 60 of 'em in a 55-gal. drum. **(263)**

Dispo is for any plant in need of an automatic dry spray booth (*Binks*) that collects overspray on a *disposable* curtain. **(264)**

Newest comer in compact lawn and garden tractor field seems to be Cub Cadet (*International Harvester*). Summer chores include mowing, lawn sweeping, seeding, fertilizing. In winter CC's a dandy little snow remover. **(265)**

Site selectors, attention! If you are seriously bent on hunting for a good place to locate your plant, write for super-duper Economic Atlas of the Pittsburgh-Youngstown Economic Area. Send requests to The Pittsburgh and Lake Erie Railroad Co., Pittsburgh 19, on your letterhead.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CONFORMING MATRIX AUTOMATIC PAINTING MACHINES
Permit production increases of hundreds to one over hand methods, and eliminate the need of experienced spray painters.
C/M
Electro-formed nickel or copper MASKS for spray decorating of intricate areas in multiple colors, one wet coat after another.
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—20 years of "know-how" are at your disposal. Write for brochure or send prints or sample parts, giving production requirements and results desired.
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"C/M Quality Tools Produce Quality Products"

182 **For more facts Circle 487 on Reader Service Card**

DETECTS PINPOINT LEAKS *FAST!*

Now you can eliminate costly equipment and time consuming operations when testing for leaks. Seconds after Superior Smoke Generating Products are ignited, the easily visible smoke issues through any openings present . . . even tiny holes, invisible to the naked eye. The odor of escaping smoke gives a further, inescapable warning of leaks.

When a leak is detected, you simply mark the hole, then close it at your convenience. Ideal for studying air flows. Absolutely no residue to stain clothing or building interior. Non-toxic . . . will not corrode metals. Non-explosive, it is the only device of its kind acceptable in the mails.

Prices range from $3.80 per doz. for 1/2 Minute Smoke Generator (4,000 cu. ft. of smoke) to $3.00 ea. for Superior Smoke Grenade (130,000 cu. ft. of smoke). Write for further size, price and technical information or see your local Jobber.

Superior SIGNAL COMPANY, INC.

Dept. F-1 6 Colfax St., South River, N. J.

For more facts Circle 488 on Reader Service Card

World's most advanced Power Sweeper

The all-new Tennant "85"

HUGE ENCLOSED FILTER (9620 sq. in.) has 3 times the filtering area of any other industrial sweeper.

BIG 16" WHEELS provide good traction, absorb shock; allow easy travel over rough areas.

"AISLE-DESIGNED". (Sweeps 53" path (total); ideal for cleaning most aisles in one round trip.

Practically perfect dust control!

Here's a *truly modern* sweeper . . . one with many features never offered before.

NEW. Constant-speed fan, side brush, and main brush. Powered so speed of rotation is constant regardless of travel speed. Sweeps equally clean at slow or fast speeds.

NEW. Giant enclosed filter gives virtually dust-free sweeping . . . *anywhere.*

NEW. Floating brush suspension; brush automatically follows uneven surfaces.

NEW. Pull-through vacuum system; removes dust *before* it goes through fan.

NEW. Lower silhouette. Operator sits safely at rear, where he can see side brush without strain.

NEW. Filter-shaker discharges dust into hopper at the touch of a button.

Heavy-Duty. All-welded frame of 3/16" steel plate. All parts accessible for inspection and maintenance.

Plus other features for safe, easy operation. Your hands stay on the wheel because heel-and-toe pedal gives instant forward and reverse control without shifting. Rear wheel steering for 67 inch turning radius. Foot brake makes it possible to sweep downhill. 12 cubic foot dirt hopper empties hydraulically in 10 seconds.

WRITE TODAY *for photos and performance data. G. H. Tennant Co., 705C N. Lilac Drive, Minneapolis 22, Minnesota.*

TENNANT

Industry's Most Widely Used
POWER SWEEPERS

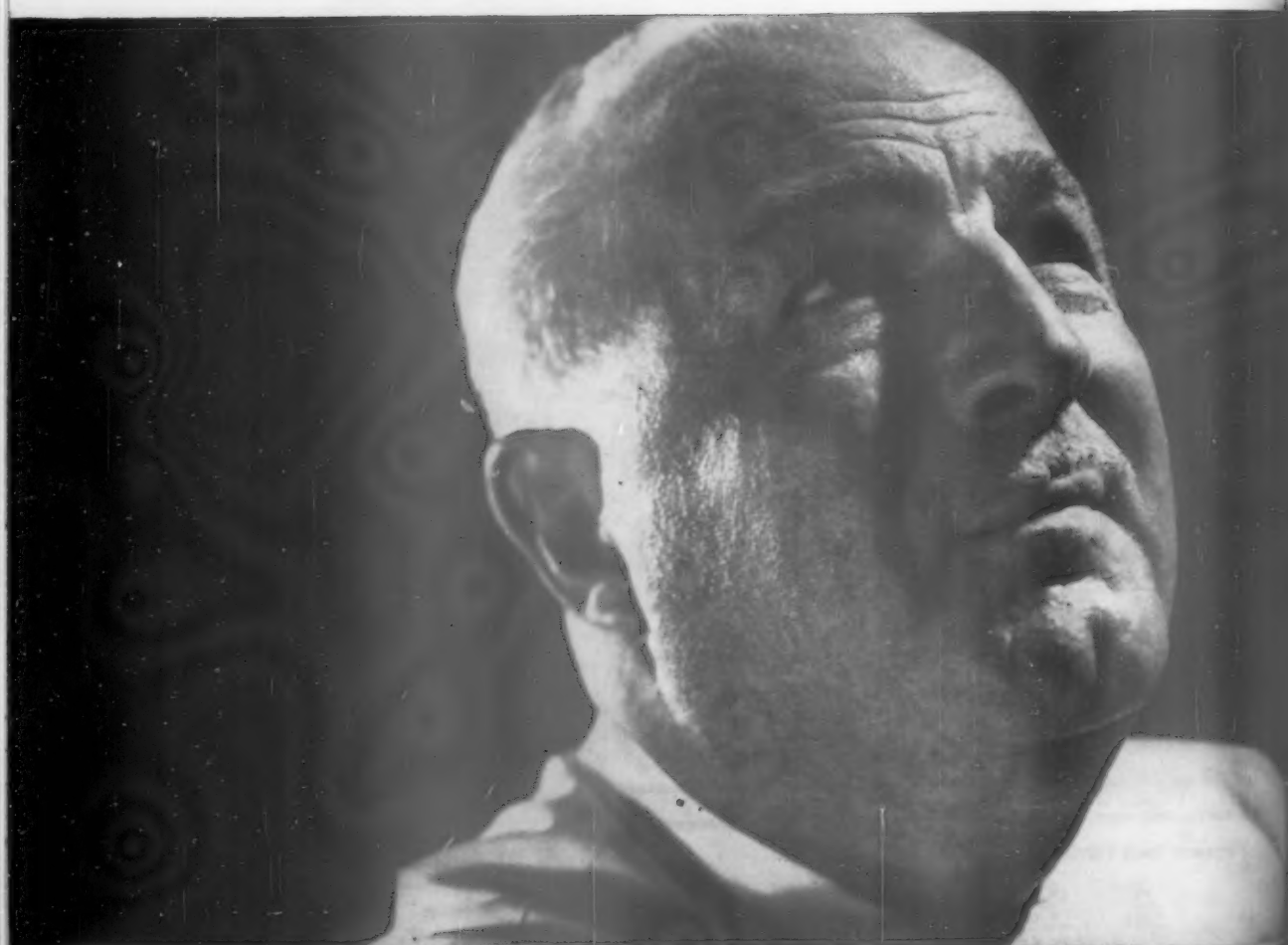
For more facts Circle 489 on Reader Service Card

For items on page 185, circle 490 for roof insulation, 491 for pipe insulation, 492 for glass modules, 493 for acoustical material

PITTSBURGH

pc

CORNING



PC Products control heat, light, sound to make your buildings better

the need: low cost, watertight insulated roofs

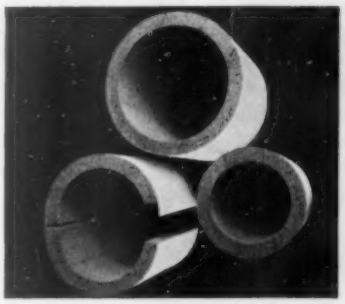
the product: PC's FOAMGLAS-BOARD™ Roof Insulation

Now FOAMGLAS, the only cellular glass insulation, is available in a new form for roofs. The 2′ x 4′ unit size, just 1½″ thick, adds to the benefits of moisture resistance, strength and incombustibility of FOAMGLAS. Result: constantly effective roof insulation at lower cost.

the need: cut pipe insulation maintenance

the product: PC's STAY-DRY Pipe Insulation

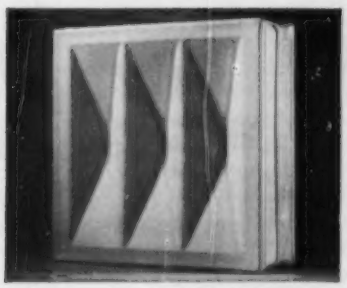
Building service line maintenance costs can be astronomical. That's why FOAMGLAS,® in the form of new STAY-DRY Pipe Insulation serves an urgent need. Its strength prevents insulation sag on vertical runs, insulation puncture by supporting members. STAY-DRY's resistance to moisture eliminates condensation problems. Its factory applied jacket is fire-retardant and the insulation is fireproof.



the need: flowing texture on a curtain wall

the product: PC Sculptured Modules

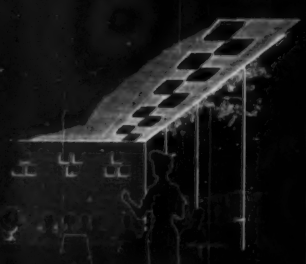
Four patterns pressed deep into each face of a PC Glass Block add the moving interplay of light and shade, to the glass curtain wall. Texture carried on and through the wall . . . with twelve ceramic face colors available to impart dramatic new effects. This is the new look which PC Sculptured Glass Modules have added to the building wall. All this with the insulation value of 12″ masonry block and surprising ease of maintenance.



the need: to hear and be heard in a room

the product: PC's GEOCOUSTIC™

Clap your hands in the average room and hear the confusion of sound which results. Hear the need for GEOCOUSTIC, a new material and method making practical distributed absorption to insure intelligibility of sound in a room. The secret is placement of surprisingly few 13½″ square units in nearly any desired pattern on multiple surfaces of a room. The result: sound absorption balanced with sound reflection to achieve better listening at minimum cost — with vivid new visual effects, as well.



For information on any or all of the products described above, simply write to Pittsburgh Corning Corporation, Dept. F-31, One Gateway Center, Pittsburgh 22, Pa.

By PAUL A. KING, Member, New York Bar

Tighten up those arbitration clauses!

Three cases recently decided by the Supreme Court will cause unions and management to collide head-on over what the arbitration clause should cover.

NEWS TIPS

• For management and unions: You cannot be forced to arbitrate a dispute you have not agreed in the contract to submit to arbitration. So be sure you have an arbitration clause and draft it accordingly. For example, to avoid arbitrating local understandings informally reached, try General Electric Company's clause to the effect that no local understanding can be arbitrated unless it has been signed by both the company and the local. Such a clause may avoid side agreements popping out of the dark corners of your plant to modify your signed contract.

• For union officers: Recognize your special duty to uphold the contract. When a union president failed to use his influence to stop an unauthorized walkout—in fact, took part in it after being warned—an arbitrator supported General Cable when it fired the man.

• For personnel executives: How much fee should a workmen's compensation lawyer claim? When is an employee being taken? Does he need a lawyer to begin with? For answers, see "Attorneys' Fees in Workmen's Compensation" (U. S. Department of Labor, Superintendent of Documents, Washington 25, D. C. Bulletin No. 200, 25¢).

• For company negotiators: It's not against the law to send letters and copies of the company's contract proposals to employees during negotiations, according to the NLRB. The letters may give the facts and plead the company's case, but should not attempt to have workers deal directly with it.

One sure result of the now famous Supreme Court decisions on arbitration (FACTORY, September 1960, page 194) is that unions will no longer take the arbitration clause for granted. It will become an important subject in collective bargaining. If your clause is tight, the union will want to loosen it. If it's loose, management will want to tighten it—to keep their prerogatives out of the arbitrator's clutches. For management, a good clause is one that limits the power of an arbitrator. Here's one that did just that.

The clause in the Standard Oil of Indiana contract was limiting enough to prevent its union from getting arbitration of the company's right to subcontract work. A U. S. District Court in North Dakota refused a request to order the company to arbitrate the question of subcontracting. In announcing its decision, the court referred to the Warrior case (one of the big three labor-history makers):

"(1) Arbitration is a matter of contract, and a party cannot be required to submit to arbitration any dispute which he has not agreed so to do.

"(2) The courts have the exclusive duty of determining whether the reluctant party has breached the promise to arbitrate—this is not a question to be left to the arbitrator.

"(3) The court's inquiry is confined and limited to determining whether the reluctant party did agree to arbitrate the grievance—it is not for the court to consider the merits of the grievance.

"(4) Where the exclusion clause is vague and the arbitration clause quite broad, doubt should be resolved in favor of arbitration.

"(5) The parties to an arbitration agreement may exclude any disputes or grievances from arbitration.

"(6) The arbitration agreement, being a matter of contract, should be interpreted according to the intention of the parties as therein expressed, and in the light of facts and circumstances surrounding the negotiations for, and execution of, the agreement."

The court concluded that the parties in the case before it didn't intend to arbitrate the subcontracting question. The clause read:

"If any question concerning the interpretation or application of any of the terms or provisions of this agreement is not settled as a result of negotiations between the refinery manager or those designated by him and the union . . . the union or the company may refer the question to arbitration . . . It is understood and agreed that proposals to add to or change this agreement shall not be arbitrable, and that no proposal to modify, amend, or terminate this agreement, as well as any matter or subject arising out of or in connection with such proposal, may be referred to arbitration. . . Questions concerning any liability or obligations of the company which require the construction or interpretation of any statute of law; for example . . . Fair Labor Standards Act, Workmen's Compensation Laws, Labor Management Relations Act, and Social Security Laws, shall not be eligible for processing under the grievance procedure."

The court, impressed with the clause, still felt it was limited: "The exclusion clause is plain, explicit, and specific." The parties had not agreed to submit the question to arbitration.

Turn the page

"We've reduced our scrubbing time from 70 to 7 man-hours ... and our floors have never before been so clean!"

— says Foreman of
BURNY BROS. BAKERY, CHICAGO

Garage and stockroom floors in Burny Bros. large, modern bakery get daily scrubbing with a *Job-Fitted Combination Scrubber-Vac* and *Setol Cleanser*

THEY'RE an unbeatable team to speed the cleaning of oily, greasy floors. *Here's why:* A *Scrubber-Vac* completely mechanizes scrubbing. It applies the cleanser, scrubs, flushes if required, and picks up (damp-dries the floor) — *all in one operation! Job-fitted* to specific needs, a *Scrubber-Vac* provides the maximum brush coverage consistent with the area and arrangement of the floors. Its teammate, *Setol Cleanser,* is specially designed for the greater speed of *combination-machine-scrubbing* ... emulsifies grimy oil and grease *instantaneously* for fast, thorough removal by the machine's powerful vac. Moreover, *Setol* retains its strength longer than average alkaline cleansers. This, too, speeds the cleaning process ... saves on materials ... and cuts operating time of the machine, which in turn reduces labor costs. The *Scrubber-Vac* shown above is *Finnell's 213P,* for heavy duty scrubbing of large-area floors. It's *self-propelled,* and has a 26-inch brush spread. Cleans up to 8,750 sq. ft. per hour (and more in some cases), depending upon condition of the floors, congestion, et cetera. (The machine can be leased or purchased.) *Finnell* makes a full range of sizes, and *self-powered* as well as *electric* models ... also a full line of fast-acting cleansers. In fact, *Finnell makes everything for floor care!* Find out what *you* would save with *combination-machine-scrubbing.* For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2503 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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Originators of Power Scrubbing and Polishing Machines

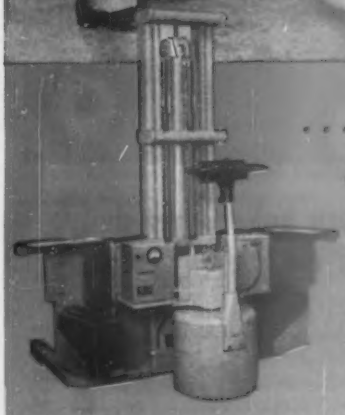
Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

NEW DIMENSIONS IN HANDLING

NEW COMPACT HIGH-STACKING WALKIE

for a NEW type handling service



...with Built-in Charger and Industrial Batteries

COMPLETE with batteries and charger, ready to run, this self-contained TIER-MASTER provides brand-new flexibility and savings in handling operations. Nothing else to buy. It's a powered time saver and auxiliary work horse for transporting, stacking, loading and unloading in plants, warehouses and stores. Works inside trucks, elevators and freight cars, too. Priced at $2895.00 complete with built-in charger and new twin industrial type batteries for long life (5 years or more), the TIERMASTER offers flexibility in all types of handling where a self-contained powered handling unit is essential. For complete details on this revolutionary and fully integrated unit, write for new Circular 34K today.

LS LEWIS-SHEPARD

153 Walnut Street — Watertown 72, Mass.

The MASTER® Line — The COMPLETE Line of Materials Handling Equipment

Begins on page 186

Subcontracting

Spin the wheel and if it stops at the right number, the arbitrator may let you subcontract work.

Here's the story of a lucky corrugated-box manufacturer and of a paper mill operator.

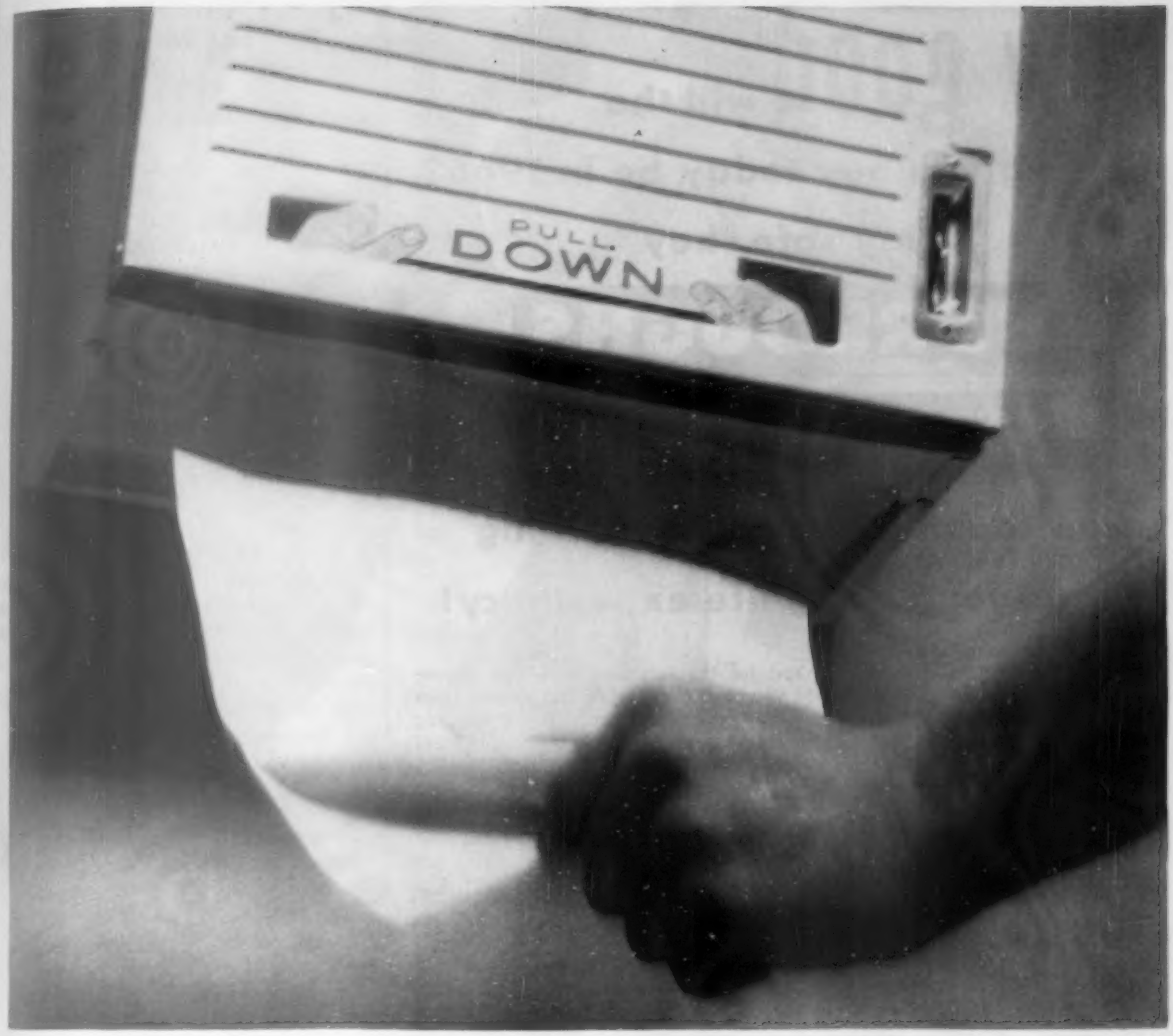
Arbitrator John A. Hogan agreed that the boxmaker had the right to subcontract janitorial services. It was not, as the union contended, a violation of the union contract's recognition clause. To begin with, the company did not have the equipment for the job. The subcontractor did. Besides, the subcontractor was able to do more work in less time. Management has the right to run its business efficiently, ruled Hogan.

Taking the same view in a case involving a paper mill, Arbitrator Benjamin Roberts supported subcontracting skids and pallet manufacture—even though at one time they had been made in the plant. Roberts felt that the only way the union could prevent this subcontracting would be through specific language in the contract forbidding it. Under the contract, management had reserved "all the rights, powers, and authority customarily exercised by management, subject only to the express provisions of the agreement." To make its case, the union had alluded to the recognition, job security, seniority, lay-off and age provisions of the contract. These were not explicit enough to suit Arbitrator Roberts.

Compensation for mental illness

Nervous breakdown occasioned by a foreman-created dilemma is compensable in the eyes of the Michigan Supreme Court.

If the foreman had given dad a going-over for lousing up the production line, dad might have cussed him out—and then been fired for insubordination. But if dad stuck it out and had a nervous breakdown instead, he wouldn't admit it to anybody—not even himself. Certainly he wouldn't expect workmen's compensation. But a modern-day worker



When towels come one at a time they all get used

NEW Steiner Serva-Matic dispenser delivers one unfolded paper towel at a time. No buttons, cranks, levers or tear off required.

A few seconds will elapse before the next towel comes out of this Steiner automatic dispenser. Means the first towel will be used before the second can be taken. When this happens every time someone dries his hands you can see the result: Fewer towels are used . . . waste is reduced . . . towel costs go down (as much as 30%). All Steiner cabinets have an adjustable control you can set to dispense towels at the rate you want . . . at the best rate to keep washroom traffic moving and to keep employees and customers satisfied. For details write . . .

STEINER

STEINER COMPANY

Dept. 60-5, 740 Rush Street • Chicago 11, Illinois

For more facts Circle 495 on Reader Service Card

how good will the

shelving you buy today be in 1966?

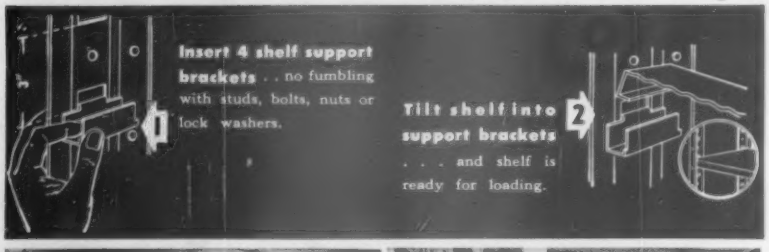
Play safe, buy

BORROUGHS STEEL SHELVING

the tough and rugged shelving with a long, long life expectancy!

YOU WIN 2 WAYS — right now — and for the future — when you choose Borroughs Steel Shelving. Not only do you save time, labor and money from the very start of its installation, but you also benefit by Borroughs' outstanding features for the life of the shelving itself. Industry recognizes Borroughs Steel Shelving as the most simple, most adjustable, most rapidly assembled shelving on the market. No special tools needed for assembly. No nuts or bolts needed to install or relocate shelves. Every unit is complete in itself. Get the whole story of Borroughs Shelving leadership from Borroughs' fact-packed catalog!

this feature alone should swing you to Borroughs


1
Insert 4 shelf support brackets . . no fumbling with studs, bolts, nuts or lock washers.
Tilt shelf into support brackets . . . and shelf is ready for loading.
2

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Represented in Sweet's Catalog, Plant Engineering File 4G BO

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A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT

3020 NORTH BURDICK ST. amp KALAMAZOO, MICHIGAN

Begins on page 186

filed a compensation claim for "paranoid schizophrenia and schizophrenic reaction, residual type"—and collected! The difference is that today psychology has linked emotional disturbances with plant pressures; and workmen's compensation boards throughout the nation are beginning to recognize such diagnoses as being compensable—if they are brought on by a single physical injury or mental shock. However, the Michigan Supreme Court carried the ball one yard further, and awarded compensation where the mental illness came on after a series of events.

The problem started in a General Motors plant with an employee whose job was to grind holes in hub cap assemblies and then place them on a conveyor belt. Being a slow worker, he fell behind unless he took two assemblies to his bench, instead of the one prescribed. In the dilemma of being fired for poor production or refusal to obey orders, he fell apart mentally, was hospitalized for a month during which he received shock therapy for a schizophrenic condition. In awarding compensation, the court asked itself this rhetorical question: "Is a worker —unable to work because of mental injury caused by his employment— to be treated differently from a worker unable to work because of a physical injury caused by his employment?" The court's answer: No.

Pension bargaining

When pension plan negotiations bog down, put in the plan provisionally. This is a formula okayed by the NLRB general counsel.

Wage-increase bargaining is a tough ordeal for both sides of the table but bargaining over a many-faceted pension plan where less heat and more light is required, is even tougher. There are many issues to be settled, many actuarial facts to be tied down.

So if bargaining bogs down because of a union-management deadlock over some of the provisions of a proposed plan, chances are you can follow this company's pattern: Put in the plan anyway, and volun-

For more facts Circle 496 on Reader Service Card

Circle 497 on Reader Service Card for items on next page

isn't it time you quit painting "tough spots" and used Copon Coating instead?

Do you have areas in your plant where it seems as if the painters are *always* at work? That's the spot for Copon. It goes on like paint – brush it on, spray it on, even roll it on. The big difference is that it *stays* on so much longer than paint, inside or outdoors.

Copon epoxy coatings are ideal for metal, wood or concrete surfaces that are exposed to excessive heat, chemical fumes, chemical spillage, salt or fresh water and other corrosive factors. Copon gives years of protection in areas where paint disintegrates in weeks! It can save hundreds of man hours spent painting ventilation hoods, cooling towers, floors, tanks, piping, air washers, heat exchangers, and production equipment.

An expert from the Copon Associate nearest you will be glad to help you choose the color and type of Copon Coating to solve your problem most economically. There's no obligation, of course. Call him today!

FOR CORROSION CONTROL

Copon®

Copon Associates: Birmingham/Industrial Paint Mfg. Co. Brooklyn/Brooklyn Paint & Varnish Co. Buffalo/Woodward-Baker Co. Chicago/Enterprise Paint Mfg. Co. Houston/Coast Paint & Lacquer Co. Los Angeles/Walter N. Dayson Co., Reliance Varnish Co. Louisville/Reliance Varnish Co. North Chicago/Reliance Varnish Co. Oakland/Walter N. Duyson Co. Pittsburgh/Ir...s B. Sipe & Co. Roanoke/Southern Varnish Co. Salt Lake City/Bennett's London, Ont./E. Wood Ltd. Mexico, D. F./Anticorrosivos, S. A. Victoria, B. C./British American Paint Co. Vitry-Sur-Seine, France/Copon France Division of Pyrolac

This Pannier Offset Bar and Tube Printer at the Superior Tube Company, Norristown, Pennsylvania, is shown marking tubing. The tubing moves from the marker right to a delivery table, ready to bundle for shipment.

MARK BARS, EXTRUSIONS AND TUBING QUICKLY, CLEARLY FOR EASY IDENTIFICATION

The Pannier Offset Bar and Tube Printer marks tubing clearly at a controlled rate of up to 450 feet per minute in a wide range of sizes. It is designed to handle rounds from ⅛″ O.D. to a maximum size of 14″ O.D. Simple adjustments compensate for the various sizes of material to be marked, including flats up to 4″ wide. Adjustable side guide rolls are available as optional equipment to permit printing on flat material from 4″ to 14″ wide.

Top surface printing permits constant inspection. Fast drying inks permit immediate handling. The standard offset printer is right-hand feed; left-hand feed is available to fit your conveyor line system without disrupting present line movements.

This unit (Model 8) will print a 24″ continuous legend; Model 12 will print a 36″ continuous legend using either premolded rubber dies or changeable type, which range in size from 1/16″ to 2½″ characters. Fast type setting saves valuable production time and speeds up deliveries. Printing components, which include the die wheel, printing wheel and drive wheel, are available in three sizes, depending on size of the characters desired. Printing components are quickly and easily interchanged.

The Pannier Offset Bar and Tube Printer is available with a ¾ horsepower variable speed motor, or is friction driven from your existing conveyor for continuous flow materials. Power is applied to the conveyor rolls. Movement of the tubing turns a friction drive wheel which turns the printing head. There is no ink buildup on the offset printing wheel, insuring clear marking.

Pannier also has a small model Offset Wire Bar and Tube Printer, which is recommended for printing materials less than 4″ O.D. Pannier engineers will be glad to consult with you on all your marking problems. For complete information, write:

PANNIER MASTER MARKERS
163 Pannier Building
Pittsburgh 12, Pa.

MASTER PANNIER MARKERS

For more facts Circle 498 on Reader Service Card

Begins on page 186

teer to continue talking to the union about its provisions. In a case approved by the general counsel for the NLRB, the company and union had agreed on some of the plan's provisions but were deadlocked on others. When the deadlock continued after many bargaining sessions, the company put the plan in force provisionally, and said it would continue to bargain with the union if the union was so inclined. The NLRB general counsel turned down the union's plea to issue a complaint against the company for failing to bargain in good faith.

Small things

Sometimes a violation is too small even for the NLRB.

Take, for example, the complaint of this employee who was invited by his boss to attend a safety award luncheon given by several employers in the neighborhood. The officers of the employees' union were also invited to the affair. Just before the big day, the employee dropped his union membership but hung on to his invitation to the luncheon. His union threatened to boycott it if he came along. Safety being an important thing, what else could the boss do but cancel the invitation?

A technical discrimination, was the opinion of the NLRB General Counsel. An isolated matter. The employee's job status was not otherwise affected. Forget it!

Strike replacements

You do not have to underwrite an economic strike. You can offer superseniority to strike replacements provided you do not discriminate.

An Erie, Pa., manufacturer found it tough sledding to get workers to replace economic strikers. It offered a 20-year seniority premium (for lay-off and recall purposes) to new employees and to strikers who would desert. NLRB Trial Examiner Reeves R. Hilton approved. Quoting a recent Federal Court decision, he said: ". . . The 'discrimination' between replacements and strikers is not an unfair labor practice despite a

ALLIS-CHALMERS

New *SpaceMaker* control is the first completely new high-voltage motor controller in more than a decade. It is the first two-high, 2 to 5 kv control center, and the first in its voltage class with complete drawout construction for unprecedented safety and accessibility.

Inspection and maintenance are greatly simplified. One man can easily roll the carriage from the control enclosure for complete accessibility. Arc chutes and barriers lift out and the pole pieces rotate to expose the contact structure.

And, SpaceMaker control is completely safe. It is impossible to come in contact with "live" parts because the contactor is connected and disconnected with the door closed and live line connections are isolated by automatic shutters.

For complete details of the new, years-ahead SpaceMaker *controller, call your nearby A-C representative. Or write* **Allis-Chalmers,** *Industrial Equipment Division, Milwaukee 1, Wisconsin.* A-1406

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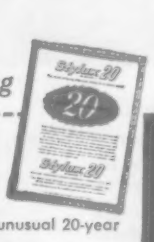
Stylux 20
BY BUTLER ®

a revolutionary achievement in plastic panel quality

A 20-year guarantee for plastic panels! This is startling news. For since the original introduction of fiberglass panels, surface failures, with corresponding loss of color and translucency, have been the greatest deterrents to panel use. Now, a major technological breakthrough enables Butler Manufacturing Company to guarantee new *Stylux-20* to maintain a uniform surface condition under normal use, for 20 years. The guarantee is in writing.

Look for this guarantee tag



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Send full details on both *Stylux-20* and your unusual 20-year guarantee.

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Stylux-20 is the lowest-cost glazing you can buy on a cost-per-year basis. Install it once and forget it. *Stylux-20* is shatterproof. It has the unique ability to withstand the harshest weather without surface deterioration. Its clear hardness provides up to 90% light transmission when used for windows or skylights. And because *Stylux-20* does not pit or erode, it's easy to clean . . . *stays* easy to clean.

New colors match *Stylux-20* to the most modern factory . . . yet because of their rich, harmonizing tones, bring new life to older plants as well. Most important, panel color and light transmission characteristics are fully protected by the special *Stylux-20* formula for the entire period of the guarantee.

You can use *Stylux-20* in a variety of applications such as glazing, skylighting, sun shades, decorative partitions or translucent sidewalls . . . using it with complete confidence of full utility without repeated repair or replacement.

Well worth looking into. Specific details are yours for the asking. Use the convenient coupon, or write direct. Taking a few moments to examine *Stylux-20* in detail . . . may well be worth many dollars in return.

tendency to discourage union activities, because the benefit conferred upon the replacements is a benefit reasonably appropriate for the employer to confer in attempting 'to protect and continue his business by supplying places left vacant by the strikers.'" Hilton decided that the offer was not illegally motivated. For one thing, the policy was adopted during—not after—the strike; for another, the company had a long record of contractual relations with the union.

Superseniority rights

You can get away with promising superseniority to non-strikers who stay on the job with this big IF: Prove to the NLRB that this was a last-ditch measure without which you would virtually have had to shut down.

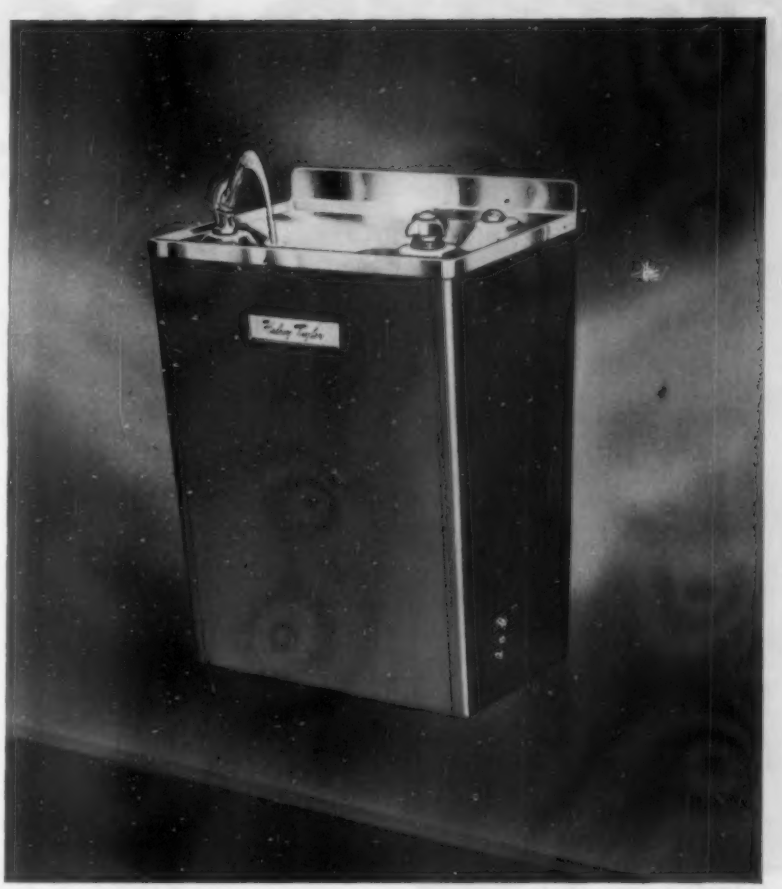
This isn't easy. An egg product company dished out superseniority promises with a free hand, but when the NLRB took a close look, it couldn't be convinced that these promises were absolutely necessary.

The group to which the promises had been made—a pretty large proportion of the work force—had remained on the job before the promises were made. It almost takes a shutdown for the Board to show any mercy.

Harassing tactics

The U. S. Supreme Court approved "economic sanctions" for union use during negotiations. But an NLRB trial examiner denied them to an employer because he hadn't followed the formula.

In child's play tit for tat is a fair rule, but for the Crestline Company trying to play this game in labor relations meant trouble with an NLRB trial examiner. Recalling that the U. S. Supreme Court endorsed the harassing tactics of an insurance company union during contract negotiations, the company wanted to play the same way when the contract with its union expired. During renewal negotiations, and without notice, it cut out holiday pay and



This is the cooler that pioneered a trend

Just a little over a year ago no one ever saw a cooler like this. We call it the Wall-Mount, truly a Halsey Taylor first.

It mounts on the wall . . no exposed fittings, no space behind cabinet to catch dirt or grime! Off the floor . . room underneath for easy cleaning! The answer to maintenance-free installation and, like all Halsey Taylor fixtures, gives years of trouble-proof service.

The Halsey W. Taylor Co., Warren, Ohio

The Wall-Tite, big brother to the Wall-Mount. Fits tight to the wall.

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Write for latest catalog, or see Sweet's or the Yellow Pages

THIS MARK OF LEADERSHIP IDENTIFIES THE MOST COMPLETE LINE OF MODERN DRINKING FIXTURES

263

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NEW DUO-FAST MODEL S-763

Powered to drive heavy staples up to 2" long

This new S-763 drives four 2" staples in less time than it takes to pound one nail.

Ideal for staple nailing crates, wood frame assemblies, expendable skids and similar jobs requiring maximum holding power.

Drives 1½" to 2", 16-gauge staples that outhold equivalent nails. Operates at 60 to 100 psi. Lightweight, easily portable, one-hand operation. Built-in safety features prevents accidental firing.

Write today for the complete story on this new S-763 Staple Nailer.

1091

FASTENER CORPORATION, 3702-10 River Road, Franklin Park, Illinois

DUO-FAST Staplers Tackers Staples

Everything you need for tacking, stapling and nailing.

Begins on page 186

discontinued insurance premium payments. It was harassing all right, but in denying the company this right, Trial Examiner C. W. Whittemore distinguished the Crestline situation from the union case decided by the Supreme Court. For one thing, said Whittemore, during negotiations, Crestline had not proposed that the holiday and insurance provisions of the old contract be eliminated from the contract under consideration. In fact, its proposals for the renewal contract specifically included these provisions. Another distinguishing factor, according to Whittemore, was that the insurance workers had announced their intended action in advance. Crestline had not.

Religious holidays

How about the employee who wants to take all the religious holidays? Do you have to put up with it?

Plant personnel executives who normally do not discriminate because of religious affiliation often are put on the spot because an applicant or an employee consistently refuses to work on his religious holidays—and there are many of them. When the time off is extensive and production is tightly controlled, which gives way, religion or production?

With a New Jersey company, it was religion. It fired an Orthodox Jewish employee who wanted time off (without pay) to observe Passover, wanted to leave early on Fridays, and didn't care for working on Saturdays. The employee's parent (the employee was a minor) sued the company for $55,000, claiming that her little girl's civil rights had been violated. A New Jersey court dismissed the suit—this was not a case of religious discrimination. But in announcing his decision, the Judge stated: "It is a somewhat sad commentary upon our modern civilization that a person had to lose her employment because of a desire to participate in a religious ceremony." He continued: "Our industries today have mass production facilities and are geared to a process whereby they can ill afford to have any of the cogs of their machinery slowed up."

For more facts Circle 502 on Reader Service Card

BYERS GUIDE

Maintenance and Operating Tips from A. M. Byers Company VOL. 2 NO. 1

ERECTED IN 1932—These Wrought Iron smokestacks installed at the Pacific Gas & Electric Company's San Rafael plant in California replaced steel stacks that had failed after six years' service. Fabricated of 3/16" Wrought Iron plate, they are 60' high and 54" in diameter.

AS THEY LOOK TODAY—Here are the same stacks today after 29 years of service. They are in excellent condition and good for many additional years of service. Such durability under adverse conditions is characteristic of Wrought Iron's built-in resistance to corrosive attack.

Steel Smokestacks Last 6 Years— Wrought Iron Going Strong After 29 Years

The service record established by the Wrought Iron stacks at Pacific Gas & Electric Company is by no means unique. Smokestacks are subjected to unusual corrosive conditions due to condensation of acid vapors on stack walls.

Corrosion severity depends on such variables as gas temperature and concentrations of sulfur dioxide and sulfur trioxide in the combustion gases. At proper temperatures sulfuric acid will condense on stack walls and create a severe corrosion problem.

Using today's costs, if a steel stack similar to one of the two pictured above should cost $800 for material and labor, a 4-D Wrought Iron stack would cost approximately $940.

Projecting these costs over a 30 year period, the Wrought Iron stack would cost approximately $940. The steel stack, being replaced five times, would total almost $4,000—and that doesn't include dismantling costs and probable price increases.

Breechings, too, can be fabricated of Wrought Iron and it is generally used in inaccessible areas where replacement costs are prohibitive, or in places where they are exposed to the elements.

Next time you are figuring stack and breeching costs—figure in the long service life of 4-D Wrought Iron plate—it will save you money.

PVC Pipe Handles Pickling Waste

The Galvanizing Department of an eastern metal producer used to dispose of pickling waste by dumping it into the river. When a river clean-up campaign prohibited this disposal means, the waste had to be stored in the plant, then conveyed to trucks for hauling to inland disposal sites.

The highly corrosive pickling waste, consisting of a 3 to 8% sulfuric concentration, required piping that could resist acid, so plant engineers specified Byers PVC plastic pipe. More than 200 feet of Schedule 80, Type I Byers 3" PVC plastic pipe is used to convey the pickling waste. The corrosive fluid is pumped at 40 to 50 psi, at temperatures ranging from 80 to 120°F. After two years' service, there is no indication of deterioration in the PVC pipe.

Spray Pond Piping— Real Maintenance Problem

Recycled cooling water saturated with oxygen and other atmospheric gases at the Anderson, S.C., plant of Owens-Corning Fiberglas Corporation, poses a severe corrosion hazard for spray pond piping. To hold maintenance costs of spray pond lines to a minimum, engineers specified 4-D Wrought Iron pipe.

More than 48 tons of 4-D Wrought Iron pipe—varying in diameter from ¾ to 12"—were specified for this installation. Bulk of the 4-D pipe was fabricated for the 250,000 gallon spray pond while the remainder was used for downspouts, return lines and air conditioning.

* * *

For additional information on any of these applications, check the coupon.

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PIPE PRODUCTS: Wrought Iron • PVC • Steel
ROLLED PRODUCTS: Plates, Billets and Bars • Wrought Iron, Stainless and Alloy Steel

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Please send data on items checked:

☐ Smoke Stacks; ☐ PVC Piping; ☐ Wrought Iron Piping

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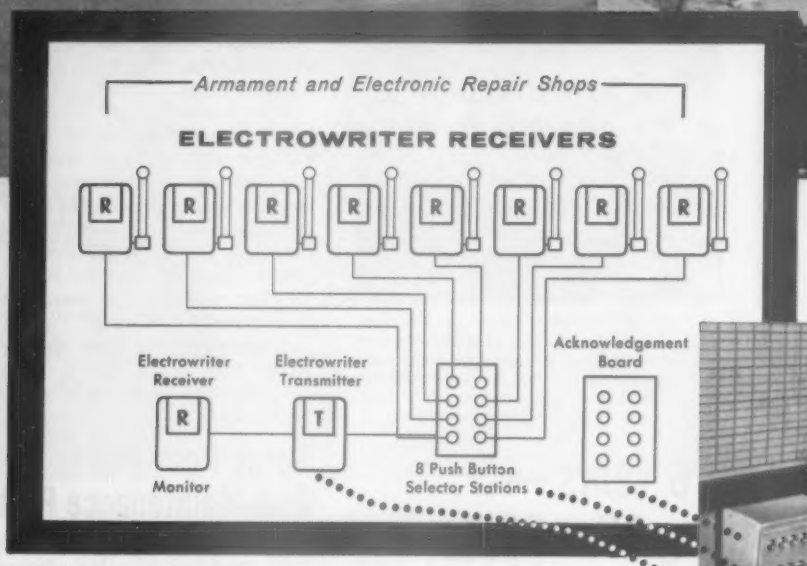

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UNITED STATES AIR FORCE

Dispatcher

Here's how ADC *Says it in writing* AT HAMILTON AIR FORCE BASE

The Air Defense Command, Hamilton Air Force Base, cuts manpower and time in processing vital aircraft maintenance instructions through the use of Electrowriter Systems. Writing directly on an Electrowriter Transmitter, Central Maintenance transmits a description of the maintenance requested by an incoming aircraft. A pushbutton selector chooses the stations to receive the message. At Hamilton, there are nine receiving stations for Field Maintenance and eight receiving stations for Armament and Electronic services. Each shop concerned with the maintenance required receives the instructions instantaneously, *as they are written.*

The Electrowriter System combines the speed of the telephone voice with the accuracy of written instructions. Only one writing of the instructions is needed throughout the entire system. Speed and accuracy is increased and manpower is saved.

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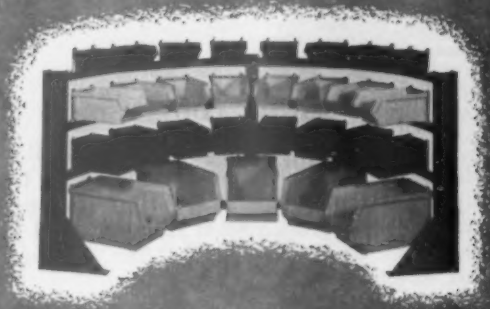
FACTORY

Lewis | PLASTIBOX ASSEMBLY CONTAINER ACCESSORIES



SEMI-CIRCULAR BENCH STAND

This bench stand provides ultimate accessibility of pan contents to a single worker. The stands are available to mount all three size Plastiboxes, as shown, or can be furnished for one size, or in other combinations of sizes to suit your assembly work. Boxes can be quickly removed for refilling.

DOUBLE and SINGLE FLOOR STANDS

These new storage racks are available as either free-standing double or single wall-supported units, as shown. Either unit will hold up to 224 Plastiboxes and either will mount all one size or various combinations of Plastibox sizes. Boxes can be quickly removed for refilling.

PLASTIBOX—PATENT APPLIED FOR

G.B. Lewis COMPANY
123 Montgomery Street • Watertown, Wisconsin

Complete details, brochure, prices and information on other accessories are available by writing . . . DO IT TODAY!

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The fast, easy way to bundle for shipping or handling. Arno Strapping Tape is quick to apply, simple to remove—yet holds securely. High tensile strength (210 lbs./inch width) of the rayon reinforcement and strong adhesion of the pressure-sensitive adhesive also make this tape a time-saver for packaging and palletizing.

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Office to mobile units or marine, the OSBORNE 300 offers the optimum in "Class D" 2-way radio communications. From its compact size, only 1⅞ x 6 x 7 inches, through its advanced circuitry design, the OSBORNE 300 achieves the dependable communications you want at the price you want . . . with "OSBORNE SELECTIVITY" — the exclusive feature that separates overlapping channel interference in the 27 megacycle frequencies. **$149.50** at OSBORNE communication headquarters everywhere.

The perfect companion . . . OSBORNE'S DUO-COM 100 walkie-talkie **$99.50 ea.** or the DUO-COM 100S with squelch at **$119.50 ea.**

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For more facts Circle 507 on Reader Service Card

HUMAN RELATIONS

By V. E. LUNARDI, Assistant Editor, FACTORY

Cat gets claws in contract

An indiscreet cat mascot, a new plant security officer, and worker loyalty set the stage for this seriocomic interplay between management and union at Pacific Mercury Electronics Corporation, Van Nuys, Calif.

First act: Ambitious new security officer strikes first blow. Decides Tom (the cat) displays undesirable hygienic habits around plant. He must go. Workers who, six years earlier, had adopted Tom as mascot, appeal to union's business manager. Cat stays, he says.

Second act: Workers get 302 of their members (out of 600 employees) to sign petition to save Tom's home. Grievance machinery is set in motion with two representatives each from union and company.

Third act: Company is adamant on Tom's personal habits. Union insists Tom has six years' seniority and habits would change if sandbox were provided. Worker loyalty to cat is put in evidence—guard, who is accompanied on rounds by Tom, tells of assuming $50 medical expense when cat was run down by car. Finally, as "union member," Tom is entitled to receive three reprimands before termination.

Fourth act: Case hits headlines and television. Gravity of situation increases. It's turning into serious morale problem. Sympathetic letters pour into union office even from Canada, giving workers definite psychological advantage.

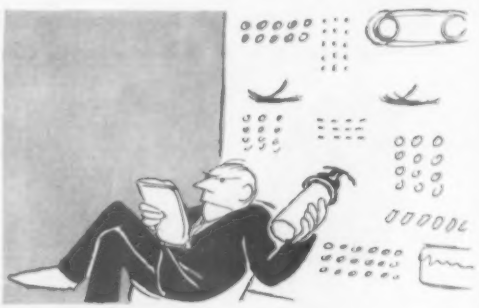
Finale: Company's industrial relations manager sends Tom letter of reprimand citing violation of Rule No. 7. It's acknowledged by Tom's paw print. Security officer, who originated complaint, refuses to sign. Company capitulates by providing sand box and shelter; presents Tom with 5-year pin. But now union is dutybound to include cat clause in contract and to agree to look out for cat's welfare. The situation seems to indicate a happy ending. Tom is cooperating by using sandbox; habits now nearly perfect; and he's a good mouser besides.

Go East, young (boss) man

New jobs for metalworking executives in the East and Midwest should not be hard to find this year. Despite depressed production, requisitions for line operating executives are practically at the same level as last year, says Cadillac Associates, Inc., Chicago and Los Angeles placement firm.

Works and manufacturing managers and superintendents in machining and fabricating operations are in the best bargaining positions. Salaries offered the former run to $30,000, while the latter run to $15,000. In moderate demand are industrial engineering, production, and quality managers in the $12,000 to $15,000 range. But there has been a significant drop in openings for executive engineers.

Over-saturation is the general story today on West Coast metalworking executives.

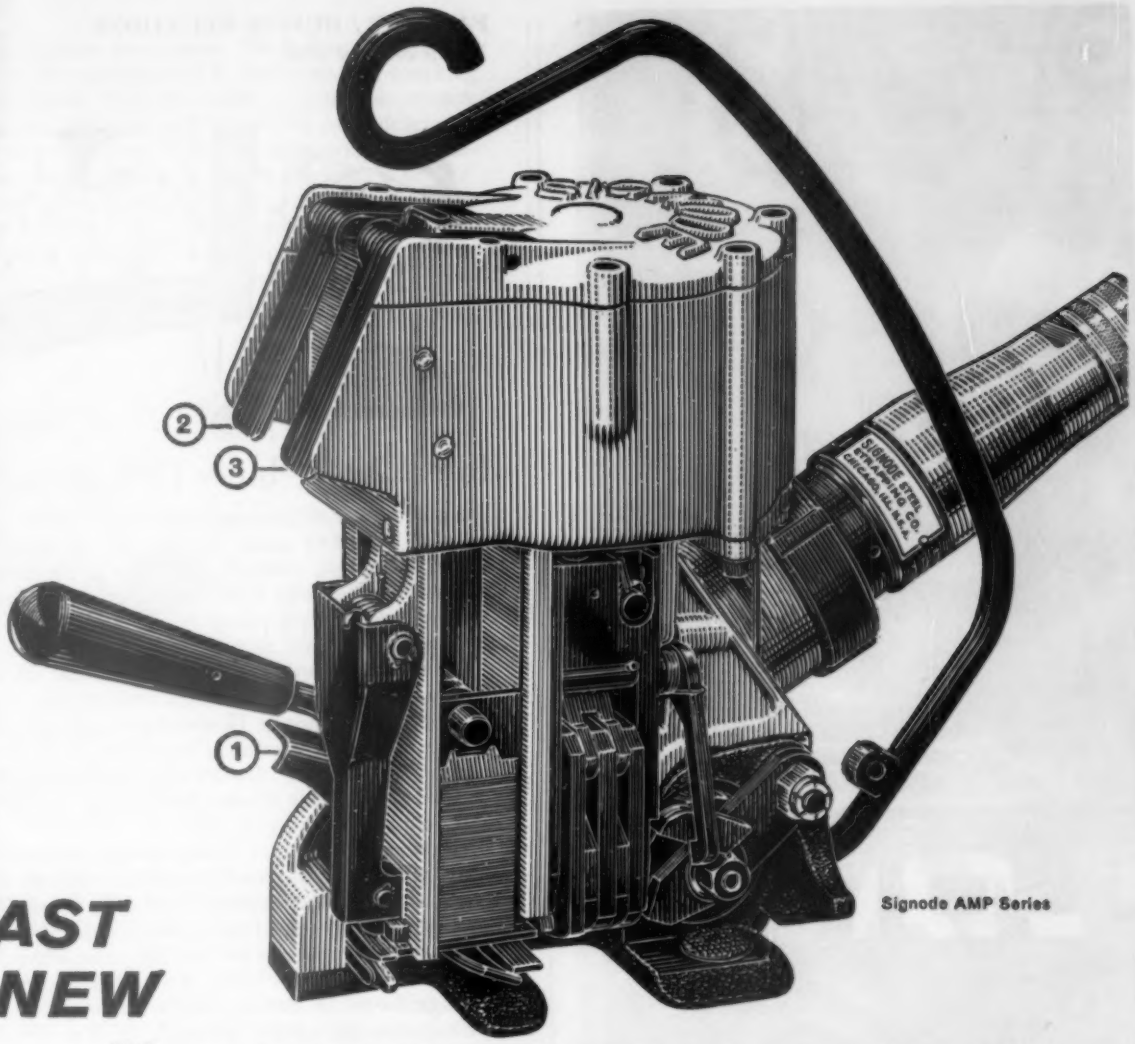


Baby sitters with white collars

Automation is creating an environment that will drive the white-collar man to unionism in droves, says Jack Barbash, labor economist at the University of Wisconsin (Madison). As machines usurp man's highly personal, professional, technical, and administrative skills, pride of achievement is drained from his job. He becomes alienated from personal contact with management and turns to his fellow worker for identity.

Mechanization will inevitably force the salaried man to work in a highly organized and rationalized industrial environment, observes Barbash. Reduced to a baby sitter for machines, he becomes a statistic, a payroll item. Identification with management becomes more and more vicarious; dreams of one day becoming boss fade steadily. A victim of industrial discipline, with its uncertainties and pressures, he associates himself with a large group of people all doing the same work. This is a ripe field for unionism, Barbash concludes.

Turn the page



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- Air power tensions, seals, and severs the strap.
- All the operator does is depress lever #1, insert the strapping, press the tensioning lever (#2), then the sealing-severing lever (#3) and remove the tool.
- Tensioning can be stopped (and held) at any time, as for the insertion of edge protectors.
- Uses new easy-loading Signode NESTACK seals that come in nested stacks (no retaining wire) that eliminate waste, spillage and delay.
- Weighs only 22 pounds, even though the base is steel for maximum durability.
- Compact balanced design and short base make tool easy to use on small as well as large surfaces.
- Comes equipped with universal suspension bracket that's quickly changed for strapping on top or side of package.
- Available now in models for ⅜" and ¾" strapping, .015" to .035" ga. Special high-tension models also available for brick, ingots, tin plate, etc.
- Tension is adjustable to 1200 lb. at 90 p.s.i., regular models.

To evaluate the savings you can obtain with this remarkable new tool in your own operations, call the Signode man near you or send for additional information.

First in steel strapping

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70-ft. cranes install easily in light metal buildings—no extra runways

American Monorail's Long Span Cranes have capacities up to 10 tons and spans up to 70 feet. They ride on just two runways and are built to the construction requirements of your building.

Begins on page 200

Interference blurs ITV picture

The outcome of this disagreement might conceivably establish a pattern governing the use of industrial TV in your plant. Opposing factions in the dispute are the employer and workers of a clothing factory (the Rosier of Agrate, near Milan, Italy) after the installation of closed circuit TV.

Despite management's reassurance that the TV was being used only to determine time rates for piecework, the workers complained. Confirming their suspicions, one worker was reprimanded for talking, another for eating. "Big Brother" Italian-style even stopped to focus an appreciative eye on a little leg art—a worker adjusting her stocking.

The "abused" workers, mostly women, reacted violently. Following a rash of headaches and hysterics, they went on strike. Support came from workers in other plants who staged sympathy demonstrations.

Talks and conferences are now the order of the day, yet no solution is near. The debate has become an ideological one. On management's side is an association representing Italian industries. It is negotiating with two opposing unions. The Communist-controlled union adamantly opposes TV control, while the Christian-Democratic one admits its use for brief periods. And these periods are to be allowed only in exchange for promises to warn workers in advance.

Psychologists, sociologists, and scientists were invited to a conference with union members and Rosier workers and managers. Opposition from the professional group on moral and psychological grounds met headlong with sound industrial operating logic. And so the battle goes. Now turn to FACTORY, July 1960, page 79, for the American viewpoint on ITV.

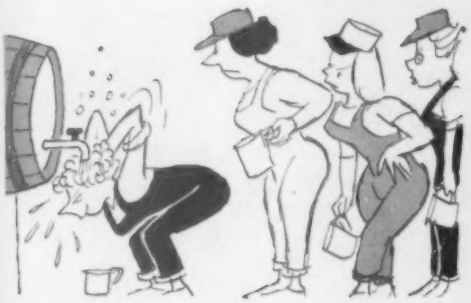
Workers overcome Achilles Heel

Employees at Thompson Ramo Wooldridge Products Division (Cleveland) are taking stock of their weak points. And management is encouraging this soul-searching by providing on-the-job training. Of mutual benefit to both, the program improves skills of hourly employees and/or retrains those transferring from one job or department to another.

The evaluation starts with a job checklist made out

by the training department. Each man gets a form covering his machine and its functions. By checking off his known skills, his weaknesses are pinpointed. These are analyzed and a training plan developed with the cooperation of works' management. On-the-job instruction follows under the supervision of foremen and department members. Classes are arranged where a number of employees show the same needs.

Not only does this program improve job performance, but it also provides initiative for self-improvement and eventual upgrading.



In a lather over beer break

A shampoo plant using beer as its main ingredient shouldn't be surprised at a high pilferage rate. But when the workers are about 60 women, the situation takes on a new complexion.

Management's hair stood on end at Lincoln Hair Products, Ltd., London drug firm, when it discovered a beer break was replacing the traditional British tea break. The girls were surreptitiously dipping their cups into a barrel of beer destined for shampoo.

When the drain became obvious to Managing Director Eric Lincoln, he decided to call a halt to the beer drinking. The girls, led by the lady factory manager, walked (?) out for four days protesting their preference for beer over tea.

An equitable solution without arbitration was worked out. No more dunking into the shampoo beer. In exchange, the girls now help themselves to beer each lunchtime and from 5 to 5:30 p.m. from a barrel set up in the canteen. And it's on the house.

U. S. low at the fringes

Although fringe benefits may add from 20 to 30% to the U. S. wage bill, industry is still getting off easy. A comparison study by the First National City Bank of New York with eight Western European countries and the United States puts us fourth lowest in percentage of hourly wages paid out in fringe benefits. Top man is Italy with 74%; next, France, 51.5%; West Germany, 44.3%; Belgium, 31%; Netherlands, 30.1%; U.S., 20.5%; Switzerland, 15.4%; Sweden, 15.3%; and the United Kingdom, 14.0%.

Fringe benefits (or "social charges" in Europe) include social security contributions, paid holidays,

With multiple runways eliminated, you get by with lighter roof supports. Yet you benefit from all the advantages of a true American Monorail crane.

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SILICONE NEWS from Dow Corning

Now...Time for the Boys

Electrical Problems No Longer Short Circuit Our Family Fun

Sure, a father should be a pal to his sons . . . and, mine are at the age when they need and appreciate my companionship most. But when you're lucky enough to be employed at an assembly plant that's doubled capacity twice in the past eight years, you've got more than a full time job . . . and family activities frequently have to take a back seat.

During these eight years I've come up through maintenance to Assistant Plant Manager. It started when I suggested we replace certain troublesome motors with silicone insulated units. Then, when we doubled our plant the first time, I suggested we could double our electrical load capacity in the same floor space by using silicone insulated transformers. Just before our last expansion, my boss was made Plant Manager and I moved up to his assistant. He's taught me a lot . . . and I think I've helped him. We're a good team. And, for the first time since I started working, I'm finding time to really enjoy my boys. By the way, the car we're restoring is a Model A. No, not a Ford . . . a Dusenberg.

I think my progress is the result of plenty of hard work and a good eye for new and better ways of doing things. One of the most important things I've ever read was an advertisement on Dow Corning silicone insulation for electrical transformers and motors—just as you're doing now. I wrote for more information. Why don't you?

For brochure, "Specify Silicone Insulation and Save", Write Dept. 3615.

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts Circle 510 on Reader Service Card

FACTORY

Begins on page 200

vacations, sick leave, private pensions, and similar items.

The U. S. is still paying the highest hourly wage, $2.22, as compared with the lowest in Italy, $.35. But fringe benefits are apt to be larger where wages are lower. Thus, the differentials in international comparisons of wages are likely to be moderated when fringe costs are added on, concludes the bank study.

Pins and pencils for creativity

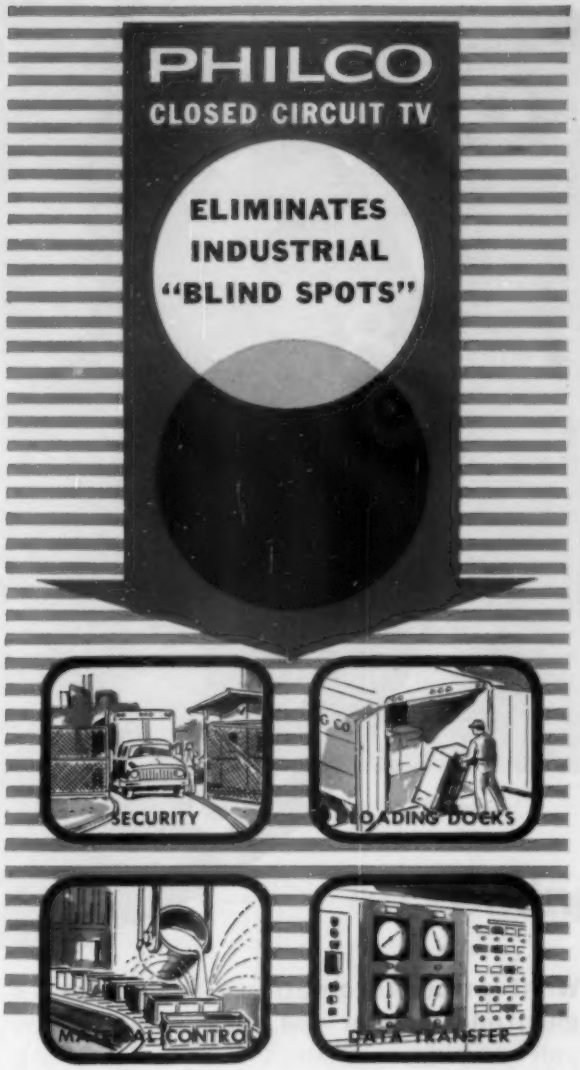
Sixty-three people equipped only with pins, paper clips, tongue depressors, a map, a box, pencils, rubber bands, and a few other items, startled management with their creativity at Eastman Kodak Company, Rochester, N.Y. Asked to produce something original with these components, they came up with 66 articles. Only 14 were duplicates. Out of the idea stream came toy cannons, a model gas furnace, a camera complete with workable shutter, weighing scales, and a teaching machine, to mention just a few items.

It's an experiment to encourage wider use of imagination on the job. Designed to develop creative potential in individuals, the program consists of ten 3-hour weekly meetings. Lectures, demonstrations, and films are expected to reap worthwhile results on the plant floor.

Silver stakes for safety

"A penny for your thoughts" loses out to inflation. Now it's a silver dollar in exchange for remembering a safety slogan. This drain on silver reserves takes place monthly at Lockheed Aircraft Corporation's Georgia division (Marietta). It's designed to promote greater safety consciousness.

Employees can't miss the briefly worded safety slogan tacked on time clocks throughout the manufacturing area. After two weeks' exposure, down come the slogans and the man with the moneybags starts on his rounds. Employees chosen at random who can quote the slogan exactly get a silver cartwheel. Maximum purse for 1961: $1200.



Philco closed circuit TV has proven invaluable in checking operations that are normally difficult and awkward to monitor in person . . . material flow on conveyors . . . bin levels . . . loading dock traffic . . . gate traffic . . . gauge watching. In addition, closed circuit TV can be used in employee instruction and plant communications. Philco's broad experience in CCTV guarantees putting this very flexible business tool in use to your best advantage. Fully transistorized equipment featuring Philco's "building-block" design assures ease of operation, freedom from maintenance problems and permits future expansion without costly replacement. Write today for your copy of the Philco Closed Circuit TV System Planning Guide.

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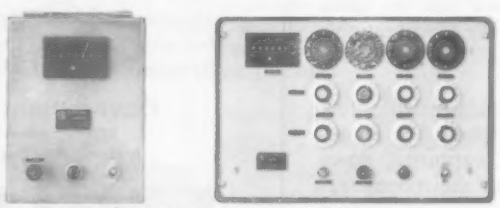
What price Automation? Veeder-Root's electronic answer will surprise you! Now you can buy automatic electronic counting and controlling functions on a "tailored to fit" basis. Just what you need to step up efficiency and cut costs. No more!! No less!! Start with what you want to count... next determine the fastest counting speed you need... then consider how you could automate your equipment by triggering one or more of its operations electrically.

With these basic facts, your Veeder-Root sales engineer can tell you which electronic counters will meet your automation requirements most economically. These compact units can count up to 300,000 times per minute. They can sense objects the size of a pinhead. Control types are easily preset to start, stop and regulate your equipment... and accurately coordinate its production. Find out how little it costs to build automation into your production setup. Write to Electronic Controls Division, Veeder-Root Inc., Danvers, Mass. **count on... Veeder-Root**



The Veeder-Root electronic counter line ranges from the 1697 Count-Pak for counting to 2500 cpm at a unit cost of approximately $100 . . . to the highly versatile 1804 series for counting up to 300,000 cpm and controlling any number of operations.

For more facts Circle 512 on Reader Service Card

Thomas S. San Giacomo, president of Cornwall Paper, Orange, N. J., says:

"Paper mill atmospheres are tough on coatings but Bitumastic No. 50 can really take it."

Seven years ago, Cornwall Paper Mills Corporation's corrugated board and chipboard plant at Cornwall, N. Y. had a corrosion problem common to paper mills: processing fumes in a highly humid atmosphere that quickly attacked ordinary coatings on steelwork and processing tanks.

Then Cornwall switched to Bitumastic No. 50, the Bitumastic coating with 20-25 mils dry-film thickness per coat, in an effort to prolong periods between re-coating. As Mr. San Giacomo says, "Bitumastic No. 50 has given us excellent service. Interior structural members, tanks, piping and a large water tank were given two coats. Our Bitumastic coating system is still in fine condition after 7 years and no re-coating is needed."

Cornwall has ordered the same heavy-duty protection of Bitumastic No. 50 for all metal surfaces in its plant addition, presently underway, which will increase the firm's capacity 25%.

Your corrosion problem may not be the same as a paper mill's . . . but the protection and long-life offered by coal-tar based Bitumastic coatings can save you expensive painting maintenance, too. There's a coating in the Bitumastic line for every industrial application. Call your nearby Bitumastic distributor for further information, or return the coupon. Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pennsylvania. District Offices: Boston, Chicago, Los Angeles, Pittsburgh, New York and Woodward (Birmingham), Ala. In Canada: Koppers Products, Ltd., Toronto, Ont.

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Management terms needn't be

Many a management meeting produces more heat than light because of confusion on terms. To clear the smoke, Author Benge has drawn on dozens of authors and plants, plus his long experience, for this handy "dictionary."

Ac·count'a·bil'i·ty—The obligation of a subordinate to report to the delegating superior upon the exercise of authority and the performance of assigned duties.

Some managers find it difficult to distinguish from responsibility. This formula may help:

Performance of duties + accountability = responsibility.

Accountability is only one way and that's upward. The boss can delegate the performance of duties and the necessary authority, but he cannot delegate his own accountability. He cannot shift his own responsibility to a subordinate.

Example: The maintenance foreman of one plant was very much of an individualist. He had his own ideas on when machines or the plant should be maintained. Production foremen were at wits' end about this situation. Frequently, they made their own repairs. When they complained to the plant manager, he said, "That's the maintenance foreman's job. He knows his business."

The maintenance foreman was not accountable for the "exercise of authority and the performance of assigned duties."

Ad·min'is·tra'tion—The planning, direction, and control of work. Some consider that "coordination" is also a part of administration.

Example: We were once asked to analyze why a capable man was failing his duties in a Midwestern manufacturing plant. An excellent mechanic, this employee, he had been promoted to foreman. But his job was confined to bossing (directing) the work of employees. He was doing no planning, and no control work. When a production scheduling system was installed, the problem was solved, because it added both planning and control to his directing.

By EUGENE J. BENGE
Benge Associates
Asheville, N. C.

Au·thor'i·ty—The power to control the human, material, and financial resources needed to discharge responsibility; and the right to make pertinent decisions.

We can set up a formula for authority. It goes like this:

Control of resources + right to decide = authority.

The textbooks tell us that authority should be commensurate with responsibility. But it is often a difficult task to know how much authority should be delegated.

Example: The wealthy son of a plant owner spent more time on his seagoing yacht than on the job as production manager. Despite his frequent absences, he would not give his three superintendents authority to hire and fire, change employee rates, or work employees overtime. The playboy manager believed that in this way he kept the lid on labor costs. He was much chagrined when an industrial engineering firm reported that the work force was 15% larger than it should be. His first impulse was to fire the three superintendents, but the consultant showed that the real problem was his own failure to delegate adequate authority to meet emergencies to his subordinates. Because of this, they had to be overstaffed.

Cen'tral·i·za'tion—The retention of authority and responsibility by a manager.

Sometimes a manager decentralizes responsibility, but keeps the authority in his own hands. An example is the manager who retains the power to control all human, material, and financial resources, and makes all required decisions. His subordinates (and they can also have "management" titles) perform their duties, and report to him on such performance. But they have no authority to exercise.

Generally, this is very unsatisfactory. Often the manager who refuses to give authority claims he can't because the men under him don't have the required ability.

Example: One well-known Chicago industrialist was president of a huge retail company and chairman of a large industrial company. He had competent men in both organizations, but they could not make their own decisions. Those who tried had their "heads chopped off."

But the men who left were usually very successful in other plants. This is a sure sign that the industrialist, who operated with complete centralization of power in his hands, was wrong in his failure to trust the ability of his subordinates.

Chain of com·mand'—The chain of reporting relationships which results from delegating and redelegating authority and responsibility to successively lower levels.

The chain of command puts demands on a manager, but can also aid him in his work.

Example: The plant manager in one company had a male secretary who for many years kept aloof from the existing chain of command. He would not take orders from the assistant plant manager or plant office manager. As a consequence, he learned little of operations, and promotions passed him by.

Com·mu'ni·ca'tion—The transmission of understanding and motivation from one person to another.

Some writers believe that communication refers to understanding only and treat motivations as a separate subject. Yet it is generally

gob'ble·dy·gook'

true that when information is transmitted, emotional overtones are likely to be conveyed also.

Example: A superintendent tells a foreman, "Get that work out by Friday." He has conveyed understanding only. If he says: "Yes, you may take your vacation beginning next Monday, provided you can get this job out by Friday," he has also communicated motivation.

Con·trol'—Establishment of performance standards for a plan, and the evaluation of performance of those responsible for carrying it out.

Evaluation requires a reporting system for information on performance. It implies standards against which performance can be judged.

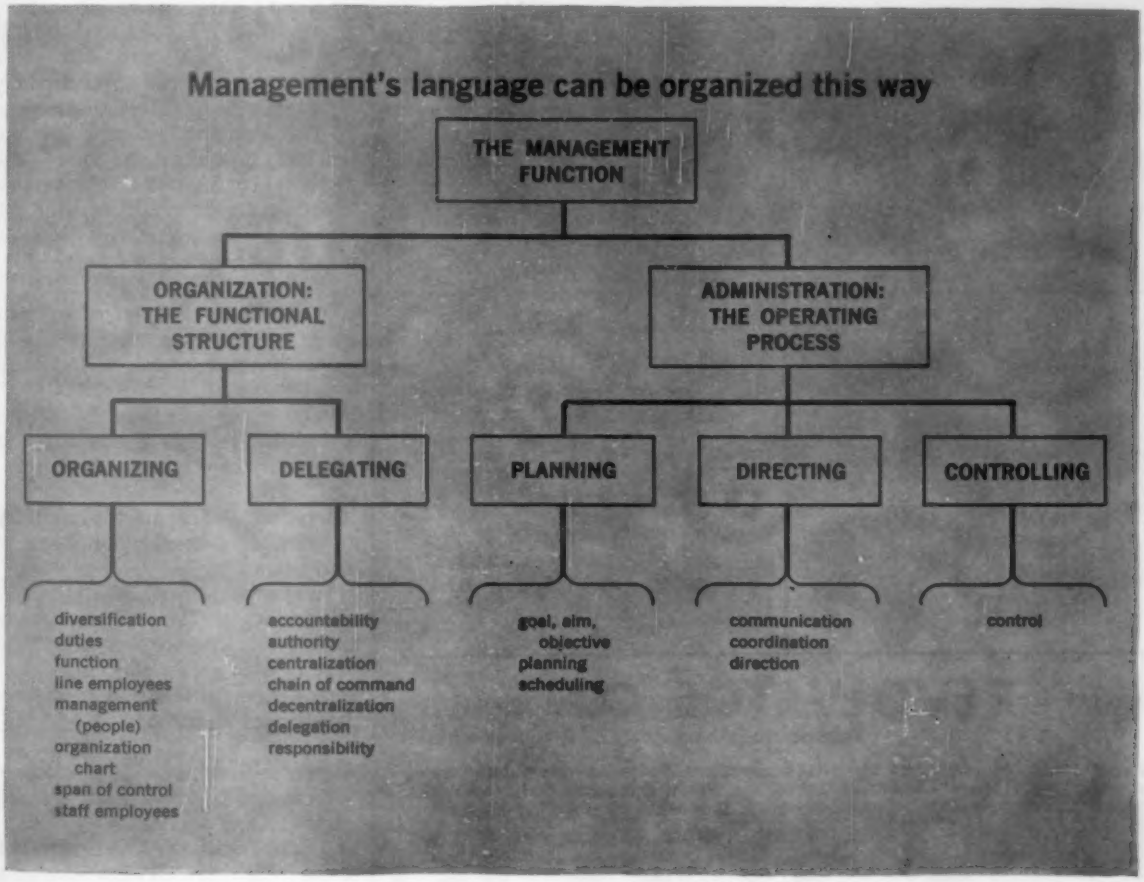
Example: A job shop had to make and assemble quickly some costly and unusual distillation apparatus. There was a deadline for shipping, with a penalty of $100 per day for late shipment. The plant manager and his four foremen set up a schedule for ordering materials, fabricating all parts, testing, assembling, final inspection, and loading. The schedule has just one day's leeway at any given point. On the wall of the shop itself, the plant manager painted a large Gantt chart, showing schedules for subassemblies and the final job. Daily progress was painted on this chart by the foremen.

This device helped complete the apparatus two days ahead of schedule—control alone made it possible.

Co-or'di·na'tion—The integration of space, time, energy, and material elements to provide unified action in carrying out a plan.

Example: In the same job shop that was making the distillation apparatus, the plant manager was "in there pitching" every day. He would assign a man from one gang to another for several hours, send the company truck to a supplier for some needed item, rent a power tool for a short period, improvise a scaffolding, authorize overtime, personally supervise intermediate tests. The work went forward on schedule because he skillfully co-ordinated the space, time, energy, and material elements available.

Turn the page



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Go-Getter powered lift trucks are available in six basic models in each of four series (stand-on or walkie, explosion proof or standard) with a range of sizes and capacities in each.

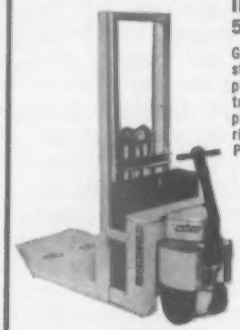
The Go-Getter is fully powered for both traction and lift. Safety factors include fingertip lift control and warning horn. Dynamic brake for downgrade control and deadman mechanical brake for positive stops are controlled by a single directional switch. Stand-on models give the operator a clear view in any direction of travel. Position of operation is fully inside the truck, offering protection from obstructions.

INDEX No. 54.11

Go-Getter low-lift platform model (ride-on explosion proof) for transporting skids. Also in standard and walk-along series.

INDEX No. 52.12

Go-Getter (Walk-along standard) high lift platform model for transporting and high piling skids. Also in ride-on Explosion Proof series.



INDEX No. 52.21

Go-Getter (walkie standard) low lift model for transporting pallets. Also in ride-on and explosion proof series.

INDEX No. 53.22

Go-Getter (stand-on standard shown with overhead guard) high fork lift straddle model for narrow aisle tiering of pallets or skids. Also in walk-along and explosion proof series.

INDEX No. 55.23

Go-Getter (walk-along explosion proof) counterbalanced high lift fork model for tiering skids or pallets. Also ride-on and standard models.

INDEX No. 52.30

Go-Getter (Combination walk-along rider) towing tractor. Also in walk-along only and standard and explosion proof ride-on series.

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MANAGEMENT TERMS

Begins on page 208

De·cen'tral·i·za'tion—The process of extending authority and/or responsibility to lower organization levels.

It means placing offices and plants at locations remote from the home office. But this is only the physical condition that sometimes accompanies decentralization of authority and responsibility. It can also occur at a single location.

Example: A manufacturer of heating equipment received a large contract to make airplane parts. The vice-president of manufacturing realized that carrying on two distinct manufacturing operations under one roof called for some drastic organizational changes.

Working with the plant superintendent and 11 foremen, the vice president authorized a plan of decentralized responsibility with defined authority. The toolroom foreman, for example, no longer needed the plant superintendent's O.K. on requisitions to replace tools up to $100. Written responsibilities, authorities, and accountabilities were prepared for other supervisory jobs and the plant superintendent.

This decentralization aided production, developed the supervisors in initiative and decision, yet enabled the vice president (through accountability controls) to keep on top of production and costs.

Del'e·ga'tion—The act of transferring selected responsibilities, with commensurate authority, to one or more subordinates.

The most common barrier to delegation is lack of confidence in the ability of others.

Di·rec'tion—The actions taken by a manager to get subordinates to carry out a plan.

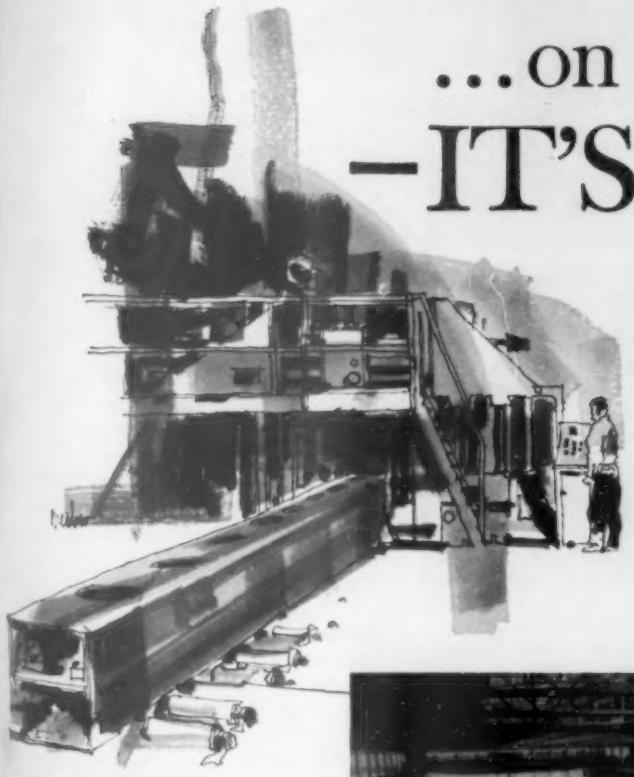
When you direct, time is usually the principal factor. Instructions should tell who is to do what, and when. This gets a plan under way, keeps it on the track. All employee levels need direction.

Di·ver'si·fi·ca'tion—The process of increasing the variety of existing products and services.

Diversification is a glib term and some managements consider it a

when management makes the **big** *decision . . .*

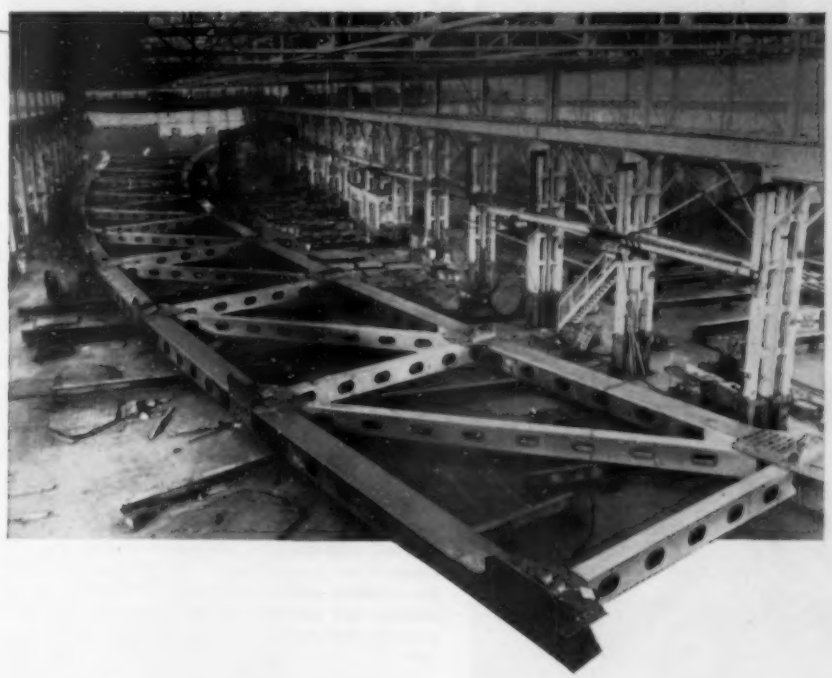
. . . on structural steel —IT'S MAHON



Mahon's Structural Division has just completed an important 'systems-engineering' project—on their own methods. The result: a new concept of fabrication technology. Mahon has integrated tape-controlled machining, automatic welding of the new high-strength (T-1 and N-A-Xtra) steels, improved handling techniques, conveyorized painting, and programmed erection—into one smooth-working, cost reducing operation. Management, whether involved with industrial, commercial or public works projects, can appreciate the inherent savings possibilities and other diverse advantages of the new Mahon approach to structural work. Mahon invites your inquiry.

CASE IN POINT:

Above: Now in use at Mahon, the Country's first application of numerically controlled machining to structural members. At right: In-plant fabrication of a giant span for the New Albany Bridge over the Ohio River.



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MAHON

For more facts Circle 515 on Reader Service Card

THE BRIDGE TO *Progress* AND *Safety*...

The bridge in this picture, designed to carry both horse power and man power across the Root River, represents a step to further expansion of Western Printing and Lithographing Company facilities in Racine, Wis.

Western selected Globe's Safety GRIP-STRUT grating on this bridge for greater safety and for greater economy. Safety GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded, in steel or aluminum, in standard sizes and gauges. It presents an open space, in a diamond pattern, in excess of 55% of the area for a positive NON-SKID footing in all directions. It is also ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

IMPORTANT SAFETY FEATURES:

Fire proof, slip proof, maximum strength, minimum weight, easy to stand and walk on, cool in summer, warm in winter.

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For balconies—no extra light needed below—no extra heat. No extra supports needed—Channels are integral part of the material. No secondary sprinkler heads necessary. Self cleaning. Cut and installed like lumber by your own maintenance force. Low in original cost.

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panacea for any ailment. Yet experience shows that poor managements can only get more deeply into trouble by diversifying products and services. On the other hand, a well-organized, dynamically managed company can do this profitably. Proper organization and competent managers spell the difference.

Example: A woodworking plant, turning out rough millwork for public housing, decided also to make knock-down furniture that could be shipped flat and assembled by customers in small assembly plants. Within a year, the company had suffered a large loss from the new operation, had to discontinue it.

The mill owner failed to realize the implications of diversification. It meant a need for artistic design, closer tolerances, quality control, selling and service.

Du'ties—Physical, mental, and social activities required of an employee because of his job.

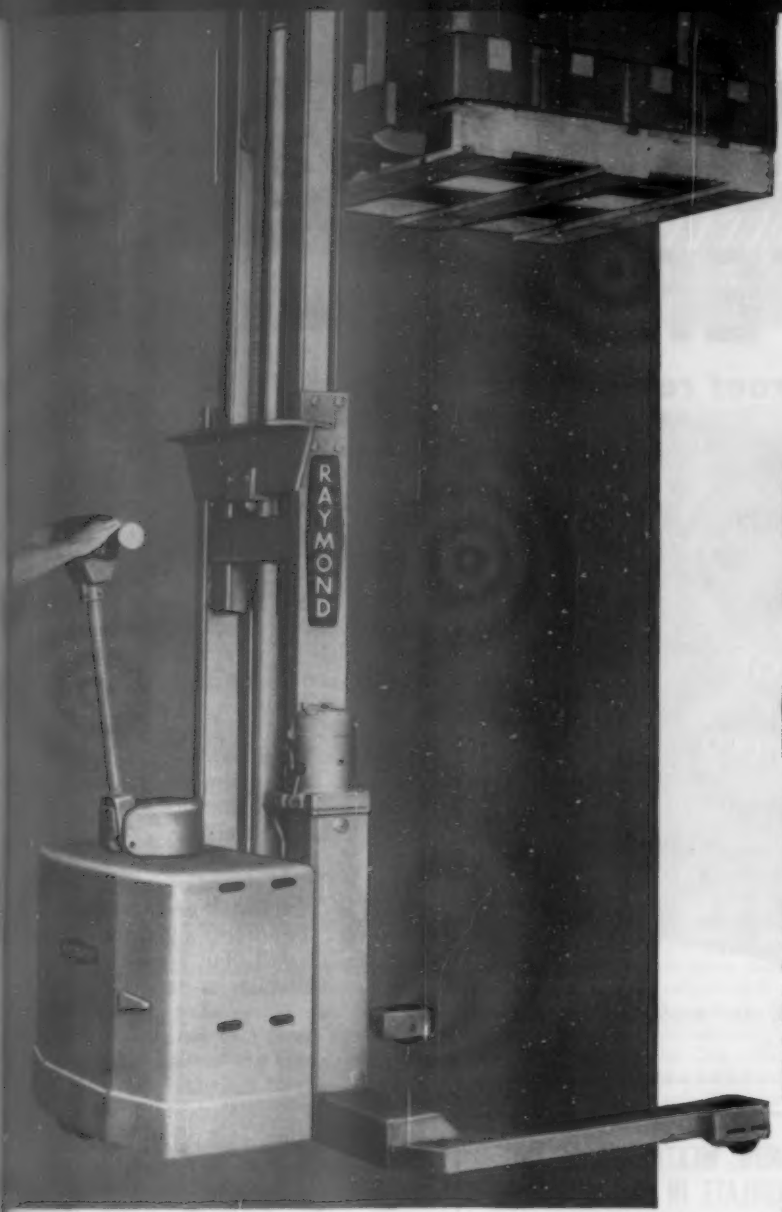
In creating a new job, the assignment of duties is normally the first consideration. It is the rare management that at the same time defines the authority and accountability and stipulates the requirements for the job. Apparently, it is easier to say what a man should do than what he should have, what he should know, or what he should be.

Func'tion—A subdivision of the total management task which groups related activities.

This is one of the most abused and indefinite words in the management lexicon. As a rule, it must be preceded by a descriptive adjective to convey any meaning: personnel function, quality control function, public relations function, etc.

Example: In a large metalworking shop, the production manager set up a grinding department and put a foreman in charge of the function. The same day, the board of directors discussed the company's production function. In a nearby college, a professor lectured to his students on the function of manufacturing in our society. And a minister wrote a sermon on the function of human society in the universe.

These four uses of the word func-



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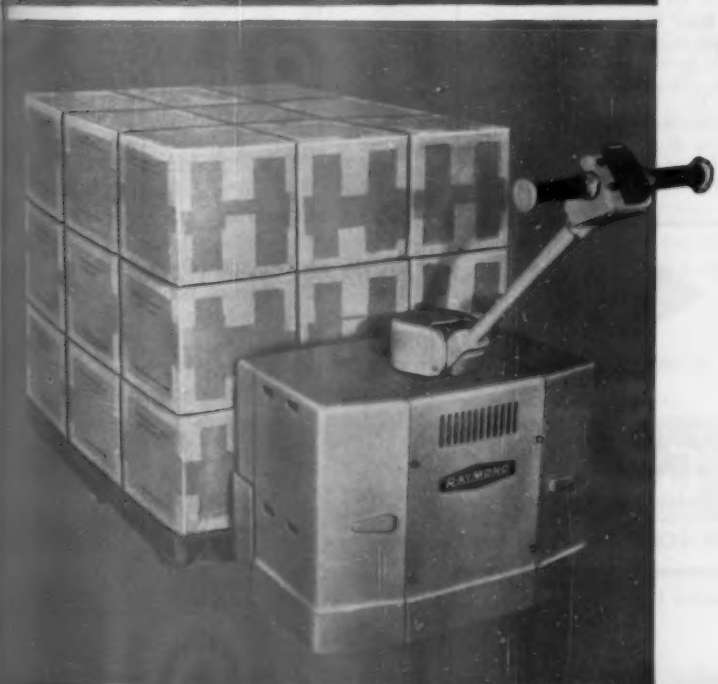

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tion illustrate what a generalized term it is. In our definition, we have considered it to be any fraction of the total management job.

Goal—A clearly defined end. This is not exclusively a management term. Its synonyms are aim, objective, and target.

Quantitative or specific goals are readily understood and provide motivation. Cost reduction is a hope, but a 5% cut in labor cost of manufacturing is a goal.

Line em·ploy'ee—Those who are directly accountable for carrying out an organization's primary functions.

The concept of a line employee may depend on where you sit.

Example: To the president, all those on the manufacturing payroll may be line employees. The vice president of manufacturing may feel that he has staff employees around him, but line employees only in the plant. The plant manager may regard his industrial engineers, lab chemists, engineers, and personnel people as staff, but foremen and their subordinates as line.

Man'age·ment (the function)—The development of the organization (structure and delegation) and the process of administering it (planning, directing, and controlling).

Each writer on this subject seems to have a somewhat different concept. This definition covers the viewpoints of a number of authors and a number of elements.

Example: Three electronics engineers developed a method of making transistors on a production line. They raised capital, incorporated a company, rented a building, hired employees, started manufacturing. These men were carrying out the two major aspects of the management function: structuring and administering an organization.

Man'age·ment (persons) — Those carrying out management functions.

Managerial personnel are of three kinds, regardless of level:

1. Those who exercise line supervision over others (foremen, department heads, etc.).
2. Those who perform staff ac-

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We don't gang separate safety switches and motor starters over a trough any more. The new QMB MOTOR STARTER PANELBOARD makes a much cleaner job. It's easier to install, it costs no more, and it's in our distributor's stock. In our business, we're concerned with overall installed costs. We find the installed cost of the QMB STARTER PANELBOARD is no greater than that of separate components. The interlock between the switch and starter doors makes a much safer installation, too.

• Plug-in construction combined with heavy-duty industrial design has made the QMB PANELBOARD a tremendous success. In fact, the flexibility of this unit plus availability from distributor stocks, has made it the leading power panelboard on the market. It's available either in 600 volt or 240 volt construction. Motor control units are available for use with either voltage switch units. When switch units exceed 200 amperes, the panelboards can be obtained from the nearest Square D Assembly Plant, completely factory-assembled. It's the modern fusible standard.

For additional information
write Square D Company, 1601 Mercer Road, Lexington, Kentucky

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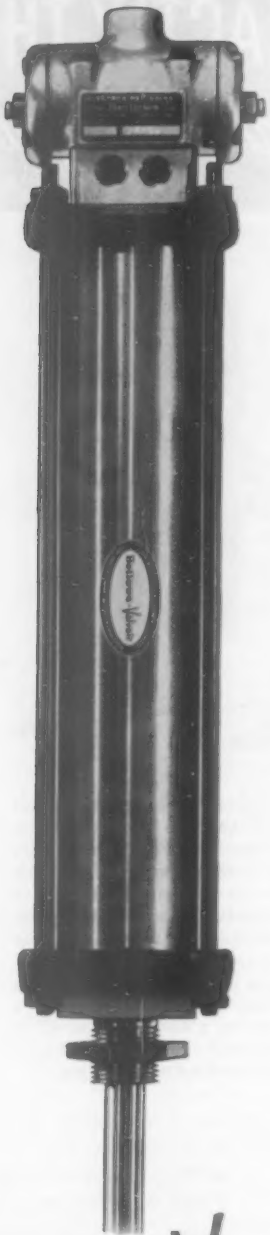

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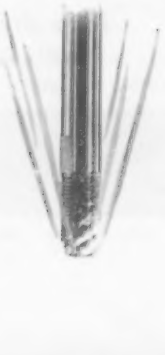
AKRON 9, OHIO

DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)



1004-C

tivities that influence line operations (quality control, personnel, purchasing, accounting, etc.).

3. Those who represent the company in dealing with persons outside the company (salesmen, public relations, lawyers, etc.).

Or'gan·i·za'tion—The structure that results from subdividing work into functions, subfunctions, and jobs; and the inter-relationships among these parts.

Such a definition considers the organization as a pyramid of jobs. It can also be considered a pyramid of people.

A pioneer in management thinking, Mary Parker Follett, wrote: "Every organization has a form, a structure. What the organization does, its unified activity, depends not on the constituents alone, but on how these constituents are related to each other."

Or'gan·i·za'tion chart—A graphic device for showing the job titles, reporting relationships, and names of those people responsible for all functions, subfunctions, and jobs in an organization.

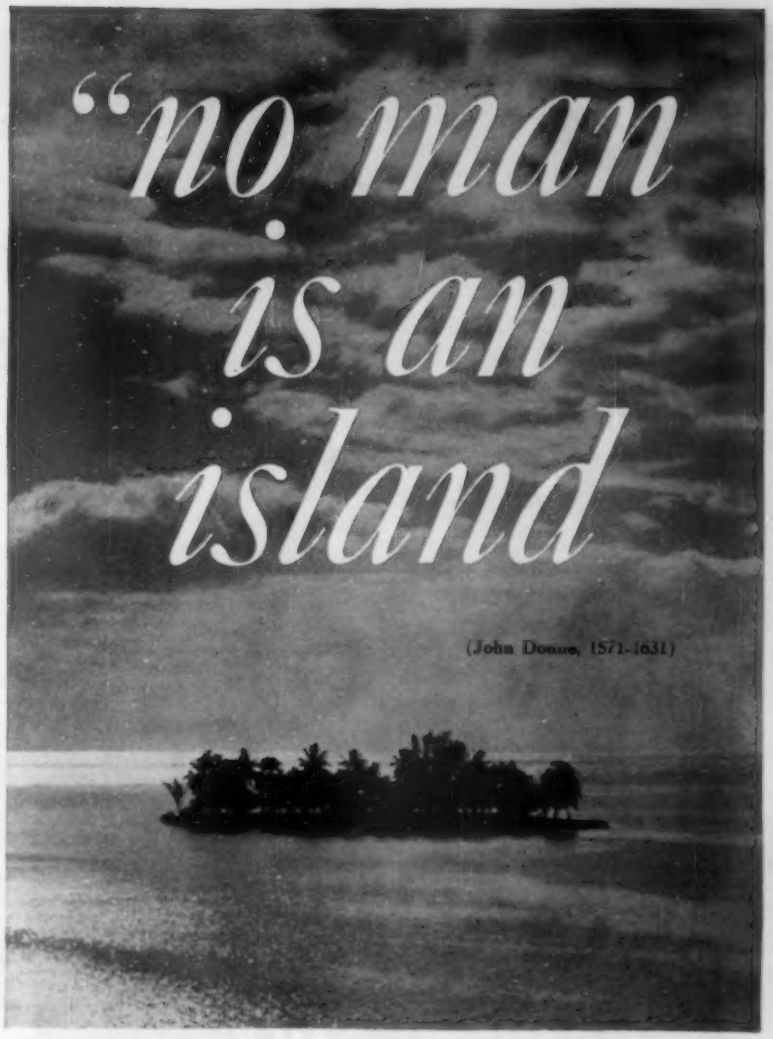
The chart normally shows both jobs and incumbents, and their direct reporting relationships. Sometimes indirect relationships are shown by means of dotted lines.

Management consultants consider the absence of an organization chart a confession of management weakness. Reason: It usually signifies unwillingness at the top to delegate, to decide, to plan, to control. It invites apple polishing, raiding, and sniping.

Almost as deadly is the organization chart that's rarely changed. The names on it change from time to time, but the boxes remain the same. Such a chart reveals either a static organization or a management unwilling to reflect the true facts of growth on its chart.

Plan'ning—The process of determining goals, policies, products, services, equipment, expenditures, procedures, schedules, locations, personnel, organization relationships, and related aspects.

Planning includes what, how,



entire of itself... Neither can a business organization expect to exist in tranquil isolation, undisturbed by forces that may wash up against it.

Survival in today's sea of competition depends upon anticipating unforeseen factors. Some, such as *fire* and *burglary*, can be controlled. Dependable protection against these ever-present threats is so vital that without it, thriving companies have been staggered overnight by crippling losses.

That is why 70,000 service subscribers, whose properties represent values in excess of 55 billion dollars, help assure the continuity of their business with ADT automatic protection.

Whatever your security requirements, ADT has the widest range of dependable electric protection services to safeguard life, property and profits. Write our Executive Office for descriptive booklet (Canada and U. S. only). Or better still, pick up your phone and call an ADT security specialist. We're listed in your directory.

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A NATIONWIDE ORGANIZATION

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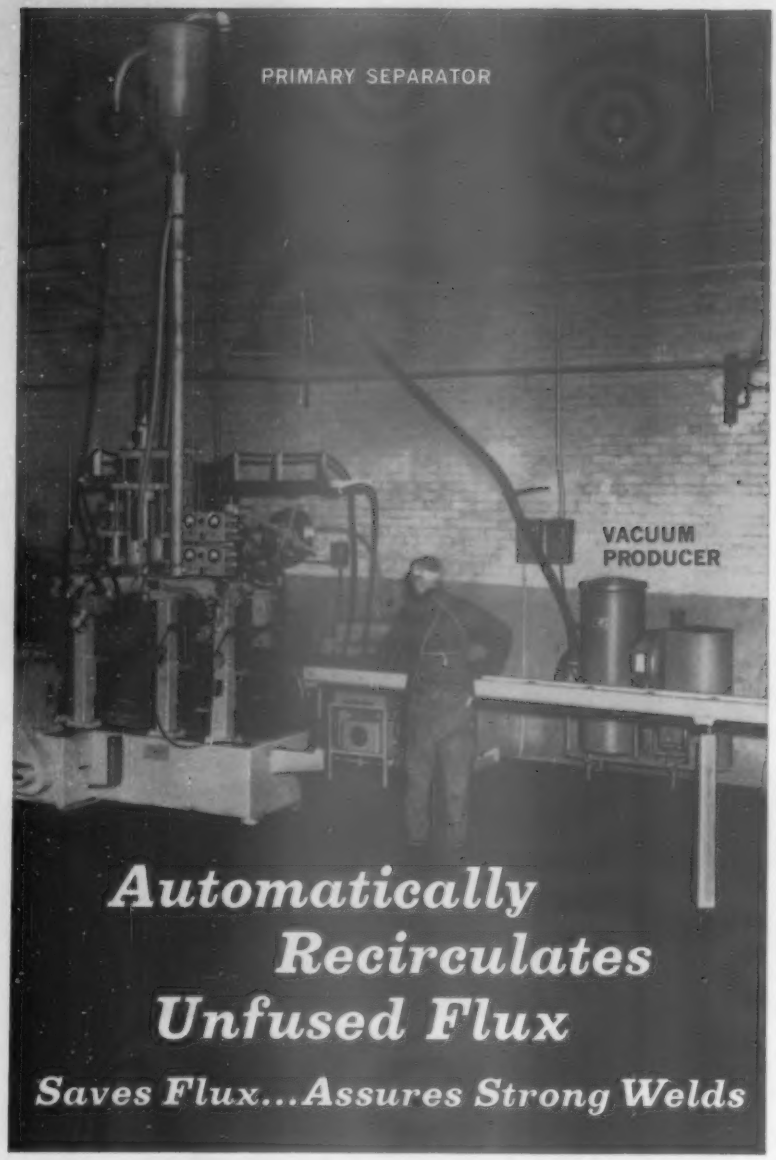

Automatically Recirculates Unfused Flux

Saves Flux...Assures Strong Welds

This Berkeley Continuous Seam Welder forms commercial angles into square welded tube at the rate of 80 inches per minute. The 5-horsepower Invincible Welding Flux Recovery System keeps pace by supplying a continuous flow of flux to the high speed welder.

The Invincible automatically recovers all unfused material. It removes powder and returns dust-free flux to the work in a non-stop operation. The results: Increased production. Absence of rejects. Strong, clean welds. And material savings that paid for the system in a few months.

With 14 standard models (1½ to 7½ H.P.), Invincible offers a system for virtually any submerged arc welding operation. Learn why Invincibles are the choice of welding fixture manufacturers — and users. Write us for a free survey of your operations. And . . .

Send for Flux Recovery Equipment Folder

INVINCIBLE

vacuum cleaner manufacturing co. • Dover, Ohio

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when, where, and who. It may have to be based on both fact and hunch. But by increasing the number of facts available, you can generally reduce planning errors.

Re·spon'si·bil'i·ty—The obligation to perform duties and accountability for their proper performance.

An employee is responsible for two things: first, performance of duties assigned; second, feedback to the boss as to the employee's exercise of authority and his performance of duties.

Sched'ul·ing—The determination of times in the future when specified tasks should be completed.

Production scheduling results from analyzing orders and translating their requirements into what is to be done, by whom, when.

Span of con·trol'—The scope of direct supervision over subordinates.

In decentralized organizations the span of control for the manager is likely to be smaller than in a centralized organization.

Example: The president of a medium-sized company prided himself on keeping in personal touch with the activities of 11 managerial subordinates. However, he overheard one manager waiting outside his door say to another, "This line forms on the right." And he noticed that his men always seemed in a hurry to get out of his office. Investigation showed that his secretary was deciding who had priority to see him and was informing each executive how long he could stay. His centralized organization plan had backfired by giving him too large a span of control.

He changed this so that only six men reported regularly to him.

Staff em·ploy'ee—Anyone who is responsible for providing information, counsel, service and (sometimes) control, or establishing control procedures over line activities.

This situation results largely from the introduction of mechanized or automated processes into a plant, plus the fuller utilization of mathematics and science in business management. **END**

RAPISTAN Ideas HANDLING

STEP-BY-STEP ANALYSIS

can cut your handling problems down to size

As with most engineering problems, those involving materials handling often seem less formidable when they are dissected and examined as smaller units of the overall flow system.

Materials handling engineers refer to this principle as "disassociation of inter-related operations"—and, for all its imposing sound, Rapistan sales engineers apply it effectively to analyze a handling problem and arrive at the most practical and economical solution.

When analyzed in this light, any flow pattern can be reduced to a series of identifiable units of movement, interspersed with related periods of storage. To effect the changes from "go" to "stop" and back to "go" again, a number of mechanical or manual transfers must be provided for. Then, all these inter-related steps must be controlled—unified into a coordinated flow system.

In this plant, live storage Flow Rack at the receiving area holds a reserve supply of many materials ultimately destined for storage at the point of use, to accumulate a full payload for fork truck deliveries to work stations. Notice the unique side-loading device on the lift truck, designed for efficient loading and unloading of hatches in the Flow Rack. Live storage also simplifies inspection, paper work, etc. at receiving department.

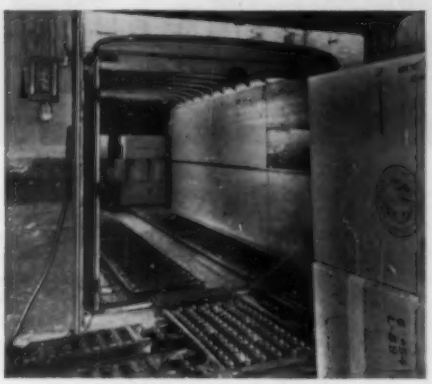
When properly "disassociated", operations that may have been considered as units frequently are found to consist of a number of steps. For example, receiving goods into storage may in reality involve 6 or 8 individual units of movement, transfer and storage.

By treating each of these units as an independently solvable problem, within the framework of the overall flow system, Rapistan handling engineers can recommend the method and equipment that will best mechanize each operation, and best coordinate with preceding and subsequent operations.

This large furniture plant has "disassociated" its receiving operations from production operations. In-coming materials are unloaded directly to platform trucks or pallets by truck drivers. Inspection and receiving forms are completed by company personnel when most convenient.

In analyzing thousands of handling problems, Rapistan engineers have found that the vast majority are closely linked to the storage of goods for long or short periods of time. Improvements in accumulation methods, therefore, promise important economies in equipment, time and manpower for materials handling. This is the area of industrial "warehousing" in which Rapistan engineers have amassed a wealth of practical experience and knowledge.

If you'd like to see some practical suggestions to solve your handling problems based on these principles, call your Rapistan sales engineer. Or, write directly to The RAPIDS-STANDARD CO., Inc., 542 Rapistan Bldg., Grand Rapids 2, Michigan, for our "Handbook of Materials-Handling Ideas".



"Disassociation" works in truck loading as well as unloading. Pallet-loads of shipping cases are accumulated on floor-mounted gravity roller conveyor Company trailers are equipped with matching roller conveyor lines, can be completely loaded in less than a minute, in a single operation.

Rapistan®

CONVEYING EQUIPMENT

Get up to 30% more use of present space. Yale's new Warehouser models let you reduce aisle space to as little as 6 feet, get maximum use of potential *square* and *cubic* storage space. Yale's Extend-A-Load model handles various widths of loads, because different size pallets and skid bins can be handled without nesting between outriggers. Extend-retract device designed for low overall height saves space in high stacking.

Stack higher, stack faster! Cubic storage space you gain can also be utilized to 20 feet or more—heights which antiquated equipment can't reach. New 24-volt system gives faster lift, more power without sacrificing maneuverability. Forks on Yale Extend-A-Load models tilt back to 6 degrees to protect load and speed operations. Can be extended, retracted or tilted at any height of lift. Separate power unit for fork extension saves on power.

It's time to face the facts

And costs show that you can't afford waste space . . . obsolete equipment . . . high maintenance . . . excessive handling . . . inefficient storage techniques. Competition isn't sitting still. Here's how you too can fight the squeeze with Yale Warehousers!

Tap your full operator potential! Operators get around with new comfort, new eagerness with Warehousers. New steering efficiency ends resentment at "pushing" around old-style cumbersome jobs, cuts operator strain fatigue. Advanced Warehouser design gives unobstructed view of right hand outrigger when picking up a pallet, and clearer visibility, greater feeling of safety, when stacking.

Increase handling and control efficiency! New pistol grip control handle permits lifting or lowering loads when Warehouser is traveling! Operator arrives at destination with fork already in desired position. Separate lifting or lowering steps are eliminated. Split-second, precision control of speed and handling control gives gentler, safer handling, cuts loss from damage to merchandise. Put a Warehouser to work for you today!

# of warehousing costs!

You get the most advanced money-saving performance you can buy with 24-volt Yale Warehousers.

For example: Warehousers step you up to greater power in less space . . . more "beef" for more efficient handling per man hour. Give you sustained, high-speed travel . . . more "go" per man hour. Smoother, faster lifting and more "reach" with higher stacking. And you cut maintenance costs with simplified rugged Warehouser design and accessible components.

Note additional details in illustrations above. Then, start your saving *now!* Yale has a finance plan that will put a Warehouser to work for you immediately. For details, contact your Yale Representative, or write:

Yale Materials Handling Division, Dept. R-103, Philadelphia 15, Pa. A Division of The Yale & Towne Manufacturing Company.

YALE®

INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS • HOISTS

YALE & TOWNE

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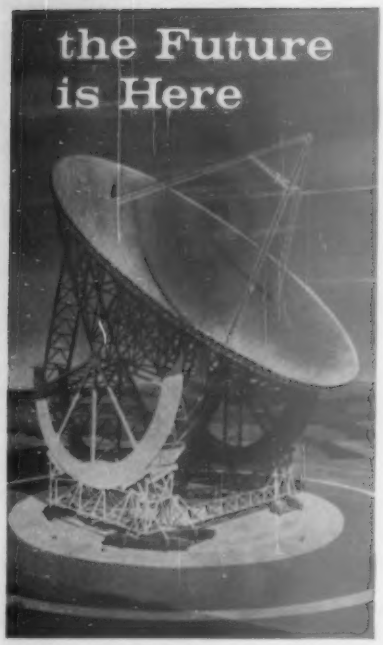


Are you trying to determine what to do about the future? Because of an exceptional combination of advantages a spot in West Virginia was selected as the site of the largest fixed movable object ever built, the U. S. Navy's radio telescope at Sugar Grove, W. Va., tall as a 60-story building.

The future needs of your company are undoubtedly quite unlike those required by such a scientific installation. But look as you will, even to tuning in on celestial bodies, few areas possess the exceptional combination of industrial assets which West Virginia offers you.

West Virginia is near people . . . more than half the population of the country is within 500 miles. It is near four of the five biggest markets.

West Virginia can provide a versatile working force, one which can be, and even will be, trained for your particular requirements and needs.

West Virginia is the biggest producer of bituminous coal, which great power plants transform into electricity; it has natural gas, and other natural resources which give the State diversified production.

If your plant can benefit by a location near the chemical groups, metal manufacturers, or near ample lumber, your future in West Virginia has a splendid prospect.

In the expanding 60's West Virginia offers exceptional opportunities. Let us hear from you. Address Executive Director, West Virginia Industrial and Publicity Commission, Room F, State Capitol, Charleston 5, West Virginia.

the Businessman's State

West Virginia

222 **Circle 525 on Reader Service Card**

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

MECHANICAL

1—Ball bearings. Wide inner-ring ball bearings that are easily mounted on straight shafts and positioned without shoulders, locknuts, or adapters are subject of 60-pager. Details on power transmission units. *Fafnir Bearing Co.*

2—Clutches. Automatic centrifugal clutches and clutch couplings for wide range of power transmission applications are reviewed in revised 44-page catalog (No. 142). Has helpful hints on installations and lubrication. *Formsprag Co.*

3—Rod ends, spherical bearings. Catalog No. 101 (12 pages) discusses construction and other features of large-size rod ends, control rod assemblies, high-angle rod ends with studs. Bearings are applied in variety of mechanisms. *Split Ballbearing Div., MPB, Inc.*

4—Cylinders. New ideas in design and construction are explained in three bulletins: No. 204 on Series H, and No. 203 on Series M hydraulic cylinders; No. 202 on Series A air cylinders. Data on accessories. *Mo-Bar Hydraulics Co.*

MATERIAL HANDLING

5—Hand trucks. Catalog T-60 (40 pages) contains description, specifications, and pictures of "job-fitted" two-wheel and platform trucks. Line includes general-purpose models, appliance trucks, dollies, etc. *The Fairbanks Co.*

6—Cranes. Bulletin TRC-102 (20 pages) describes Trak-Rak crane that consists of a top-running or under-running bridge crane and a trolley. Points out advantages and tells what materials can be handled. *Chicago Tramrail Corp.*

7—Pallet loader. Here's a 4-pager that tells about a fully automatic, high-speed, row transfer-type pallet loader. Shows unique row-by-row loading method used to stack cartons and cases onto pallets. *Engineered Handling Systems.*

8—Truck crane. This 12-page booklet gives details about truck crane that's rated as a 15-ton lift crane and as a ⅝-yd. excavator. Easily converted to dragline, clamshell, trenchoe, and magnet applications. *Unit Crane & Shovel Corp.*

9—Conveyor. Principles and features of wheel and live roller APC (adjustable pressure) conveyor are given in Catalog 1200 (8 pages). Lists dimensions and belt speeds. *The Rapids-Standard Co., Inc.*

10—Lift truck. Bulletin SS-2067 is a 6-pager with engineering specifications covering gas-powered, stand-up, end-control fork-lift truck. Shows two models with capacities of 2000 and 2500 lb. at 24-in. load centers. *Clark Equipment Co.*

11—Bucket elevators. Bulletin 6057P (24 pages) contains simplified selection charts and information on centrifugal and continuous discharge elevator components. These include chains, buckets, sprockets, bearings. *Chain Belt Co.*

12—Cranes. Manual (No. 61A) has 64 pages on hoists and cranes. Components: end trucks, enclosed conductors, crane drives, fluid drive motors for building top-riding and underslung cranes. *Consolidated Crane & Engineering Corp.*

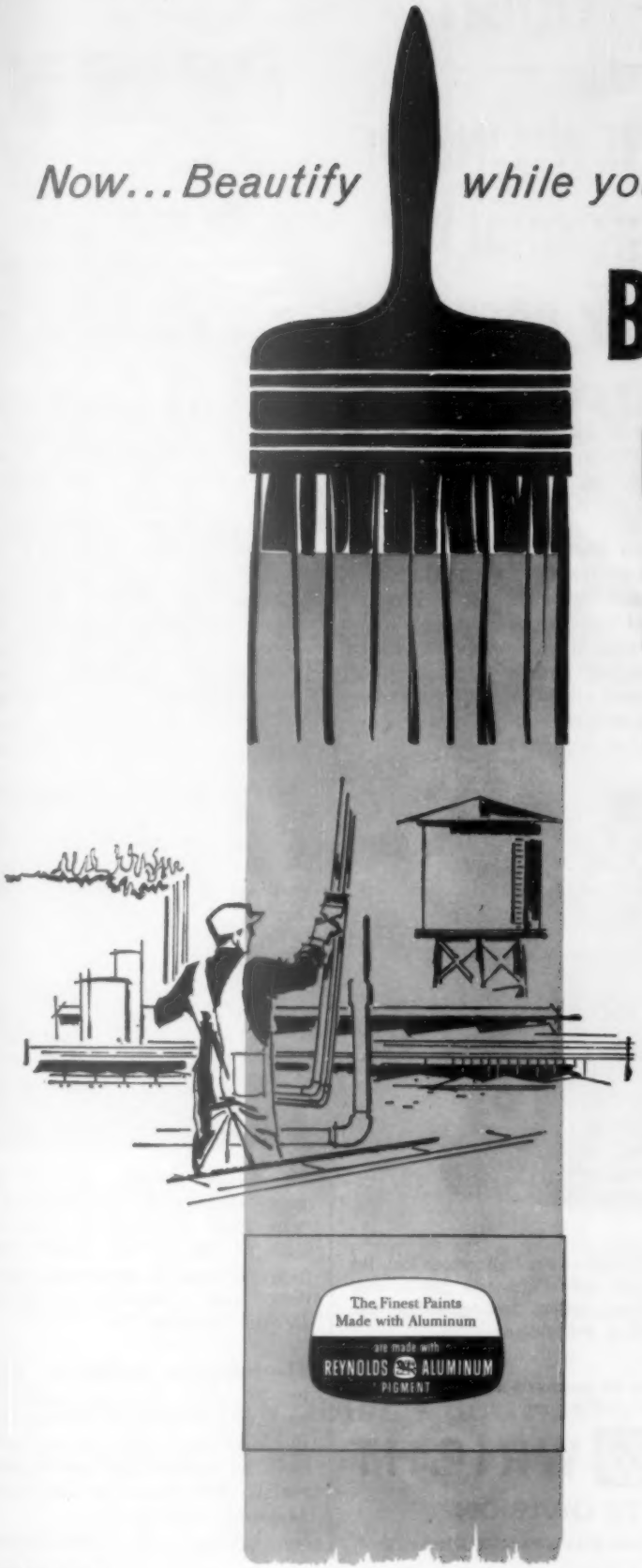
13—Conveyors. Construction and installation data are given in this 20-pager. Whatever the need, you'll find the right conveyor components for solving your handling problems. Application diagrams. *Food Machinery & Chemical Corp.*

14—Conveyor controls. Bulletin MP50-6011 (6 pages) covers centralized, fully automatic control systems for package, part, unit, or container conveyors. Principal units: dispatcher, marker, tally, reader, coordinator. *Flo-Tronics, Inc.*

Turn the page

Now... Beautify while you protect with

BRUSH-ON COLORED ALUMINUM PAINTS



Dazzling new colored aluminum paints and roof coatings are now offered by leading paint manufacturers using Reynolds Aluminum Pigments. These coatings *decorate* roofs, fences, masonry, tanks, fixtures and machinery —and *protect* them with a tough aluminum "shield." These eye-appealing colored aluminum coatings don't have to be sprayed on... an ordinary paint brush will do the job.

The new colored aluminum paints still give you all the famous aluminum advantages: heat reflectivity, insulation, corrosion resistance and protection against rust. Yet these new paints are economical to use, and are available in formulations suitable for indoor and outdoor use.

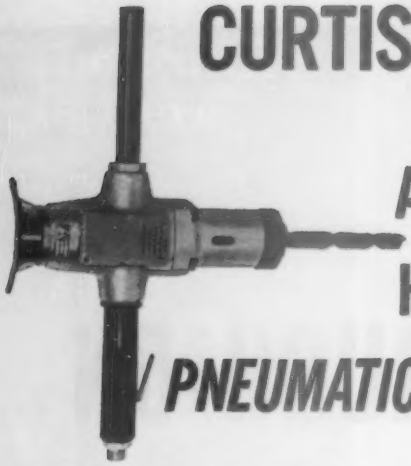
Reynolds does not make paint, but does supply the finest aluminum pigments to leading paint manufacturers. For further information and names of manufacturers, write *Reynolds Metals Company, Box 2346-PJ, Richmond 18, Virginia.*

Watch Reynolds TV show
"Harrigan & Son", Fridays; also
"All Star Golf", Saturdays—ABC-TV

CURTISS-WRIGHT

ANNOUNCES

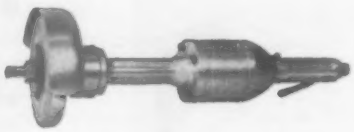
A NEW LINE OF HIGH QUALITY PNEUMATICALLY OPERATED HAND TOOLS



PNEUMATIC DRILLS — Sizes from ¼" to 1¼". Weight, ½ to ⅓ as much as comparable electric drills. Easily controlled speed, for slow starts without pre-centering.

Precision designed, pneumatically operated hand tools manufactured by the internationally known Grasso Works of Hertogenbosch, Holland, are now sold and serviced through the Marquette Division, Curtiss-Wright Corporation. Here is the complete selection of economical hand tools that combine light weight and rugged construction with high speed and excellent balance for fast, comfortable, safe operation and long maintenance-free service. For production, maintenance, and general utility work the complete line of hammers, drills, sprayers, riveters, rammers, and the all-purpose 6-in-1 COMBINAIR kit meet every industrial requirement.

GRINDERS — Small, compact, and powerful with diameters from ¾" to 9".



HEAVY DUTY HAMMERS — Available with round and hex shanks and a wide range of fittings for cutting, scaling, chipping, caulking, etc.

COMBINAIR — 6-in-1 all-purpose tool. The basic unit, with attachments, can be used for drilling, cutting, sanding, buffing, corner drilling, and polishing.

FOR INFORMATION WRITE THE MARQUETTE DIVISION, CURTISS-WRIGHT CORPORATION.

CURTISS WRIGHT

MARQUETTE DIVISION

1145 Galewood Drive, Cleveland 10, Ohio

AD NO. 22-8

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FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

PRODUCTION

15—Milling machines. Numerically controlled horizontal die sinking and contour machines are described in 12-pager (DM-115). Tells operating advantages and cost savings of horizontal spindle design. *Giddings & Lewis Machine Tool Co.*

16—Worm gear screw jack. Bulletin 4421J (36 pages) is an engineering study covering this type of jack used to adjust, level, and position various items of machinery. Five models. Selection and other data. *The Joyce-Cridland Co.*

17—Grinding wheels. This 40-pager, "American Standard Specifications for Standard Shapes and Sizes of Grinding Wheels, 1960," supplements and replaces "Simplified Practice Recommendations of 1957." *Grinding Wheel Institute.*

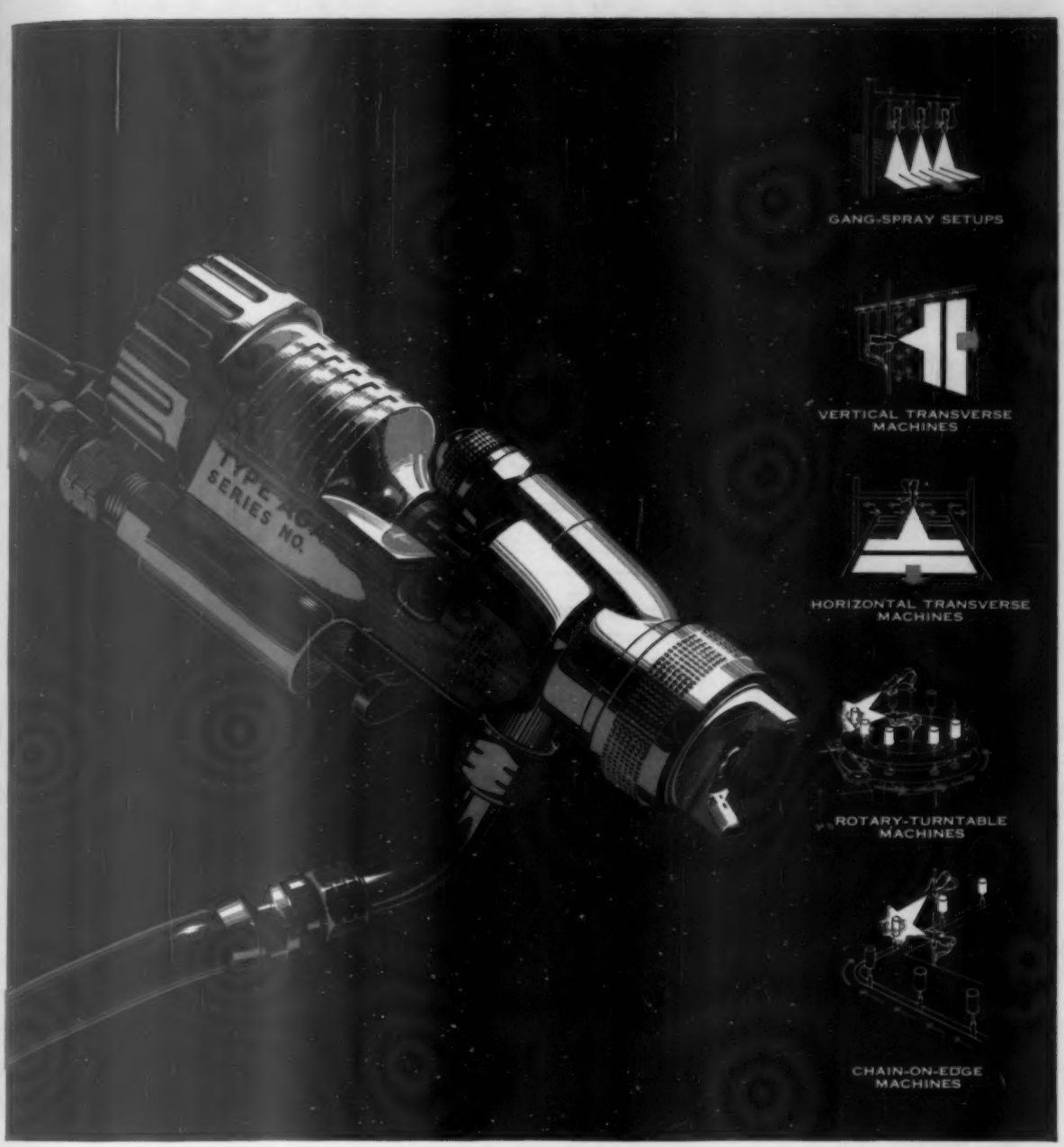
18—Blast-cleaning barrels. Bulletin No. 706 (16 pages) describes outstanding features of company's standard or automated Rotoblast units. Outlines case histories. Has table of dimensions and specifications. *Pangborn Corp.*

19—Vibration mounts. Design, construction, installation, and performance data are given in 8-page brochure. Mounts employ principle of "rubber-in-shear" to isolate vibration, suppress sound of machinery. *Hamilton Kent Mfg. Co.*

20—Toggle clamps. Here's a 36-page catalog (No. 77) designed to help users find quickly types and sizes of clamps they need. Illustrates all models; templates provide dimensions. Application photos. *Detroit Stamping Co.*

21—Inspection equipment. Bulletin No. 130 (4 pages) describes new single-frequency non-destructive inspection equipment for finding flaws in non-ferrous, non-magnetic metals. Tells how flaws are located. *Magnetic Analysis Corp.*

Turn the page



automatic spray from DeVilbiss gives you control and uniformity not possible by other methods for applying paints, adhesives, glazes; marking, stenciling. It's part of a complete line of matched equipment for coating and finishing: spray guns, dip and flow coaters, spray booths, air and fluid hose, ovens, spray washers, air-replacement units, dust collectors, "turn-key" finishing systems.

Talk to DeVilbiss about all your automatic spray-coating needs

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DEVILBISS

THE DeVILBISS COMPANY, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.

BULL OF THE WOODS
by J.R. WILLIAMS
STOP IT, YOU LUNKHEADS! THIS NEW KOLLMANN CAN OPEN THAT DRAIN LINE IN FIVE MINUTES WITHOUT DIGGING!
WATCH THIS! THE BULL TOLD MAINTENANCE NEXT TIME THAT DRAIN PLUGGED HE'D FIX IT FOR GOOD--SO MAINTENANCE BOUGHT A KOLLMANN 500 ON THE QUIET AND WAITED TO SPRING IT ON HIM!
QUESTION NOW IS WILL THE BULL HATE MAINTENANCE FOR LETTIN' HIM GET INTO A TWO-DAY MESS... OR WILL HE BE SO HAPPY TO STOP LOSIN' DOWN-TIME FROM PLUGGED DRAINS HE'LL VOTE 'EM ALL A RAISE!
THE LATE "SPRING"

Many of the "big names" in American industry save money and nuisance with Kollmann power drain cleaners

The 500 is "worth its weight in man hours" saved annually. Fast, rugged, operated by one man. Quickly drives through chips, congealed oil, grease, rags. Up to 200' through traps in lines from 4" to 10"... and can be adapted for 1½" & 3" lines. *Write for particulars.*

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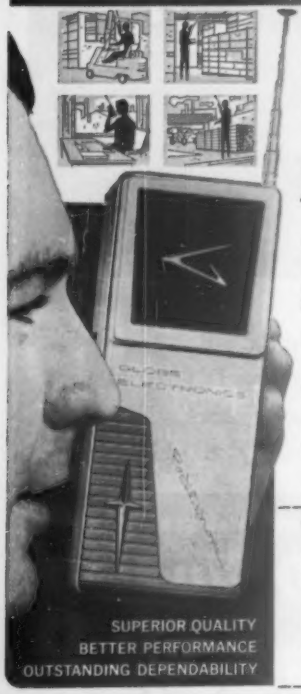
Save TIME and DOLLARS with
"INSTANT 2-WAY RADIO CONTACT"



Talk and Listen Instantly to Your Men "On the Job"

New 2-way radio actually fits into your pocket. Exclusive, rechargeable battery lasts year or more. Range—½ to 1 mile. No license required.

GLOBE ELECTRONICS
Pocketphone
THE FINEST 2-WAY RADIO AVAILABLE TODAY

Ideal for office, factory, stores, surveying, construction, sports, recreation, home. Finest quality available. Makes handy paging system. Use with Globe Electronics CB-100A or CB-200 for longer range systems. • Actual size — 1⅝" x 2⅝" x 6¼" • Weight – 13 oz. • High impact Cycolac case • All Transistorized. $125.00 each

FOR LONGER RANGE COMMUNICATION

CITIZENS BROADCASTER CB-100A... Complete 3-channel, 2-way station. Fixed or mobile installation. Easy to install, operate. Range 5-15 miles. $139.95 each

BROADCASTER DELUXE CB-200... A rugged transceiver for commercial use. Transmits on 5 channels. Receives on all 22. Adapts to selective calling system. $189.95 each

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Please send me complete information on the new Globe Electronics ☐ Pocketphone ☐ CB-100A ☐ CB-200

FA-3

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SUPERIOR QUALITY
BETTER PERFORMANCE
OUTSTANDING DEPENDABILITY

FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

22—Roll-formed shapes. Techniques used in roll-forming shapes, and drawings of angles, channels, tubing are given in 36-pager (No. 760). Examples of punching and notching combined with roll forming. *Roll Formed Products Co.*

23—Drilling fixtures. Catalog LS-60-1 (8 pages) tells about fixtures that feature a Swing-Away top plate, which can be moved completely out of the way. Gives tooling suggestions, table of sizes, and diagrams. *Accurate Bushing Co.*

24—Welding equipment. Short-form catalog (6 pages) illustrates nine power supplies and eight weld heads and handpieces. Applications: medium duty to fine precision welding. *Hughes Aircraft Co.*

25—Die-cutting machine. This 6-pager, "New Concept in Cutting," explains use of machine to improve quality and cut costs. It's electrically driven, hydraulically powered, and electronically controlled. *United Shoe Machinery Corp.*

MAINTENANCE

26—Insect control. Booklet (8 pages) deals with the problem of flying insect control. Describes and illustrates jumbo-size electronic panel equipped with black-light fluorescent tubes to attract insects. Photos. *Gardner International Corp.*

27—Fire-fighting equipment. Engineering and specification data on extinguishers, fire hose, racks, reels, nozzles, other products are given in 16-pager (No. S-62 FPB). Photos show equipment; tables give dimensions. *The Fyr-Fyter Co.*

28—Bearings, bushings. Two catalogs: No. 59-2 (4 pages) describes self-aligning bearings that can take extreme temperatures from −300 to +1200 F.; No. B60 (16 pages) covers drill jig bushings in several models. *Accurate Bushing Co.*

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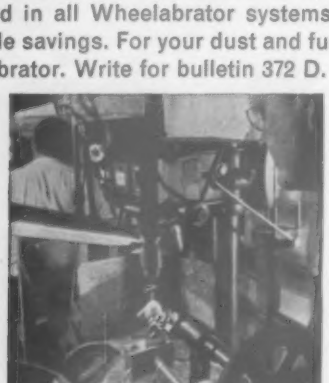
INLAND

dust control with 25% savings in fuel bills for Dr. Grabow

A demonstration of WHEELABRATOR'S

VITAL VALUES

A Wheelabrator Dustube cloth tube type Dust Collector ventilates all dust-creating operations at Sparta Pipes, Inc., Sparta, N.C., manufacturer of Dr. Grabow Pre-Smoked Pipes. Replacing an old, open dust bin, the control system not only solved the dust problem, but also cut fuel bills at least 25% through recirculation of heated clean air, and reduced building maintenance costs 15%. The high filtration efficiency of the Wheelabrator Dustube is just one example of the many Vital Values incorporated in all Wheelabrator systems which bring bonus benefits and multiple savings. For your dust and fume control problems investigate Wheelabrator. Write for bulletin 372 D.



Three floors of manufacturing operations are ventilated by a Dustube Dust Collector that has brought 5-way savings to Sparta Pipes, Inc.

VITAL VALUES FOR INDUSTRY

WHEELABRATOR DUST AND FUME CONTROL

WHEELABRATOR CORPORATION, 374 S. Byrkit St., Mishawaka, Ind.
In Canada, WHEELABRATOR CORP. of Canada, Ltd. P.O. Box 490, Scarborough, Ont.

For more facts Circle 532 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

29—Burglar-alarm systems. Here's an interesting 12-page bulletin (U1R4) that deals with ultrasonic alarm systems in either permanent or portable models. Includes typical installation diagrams and photos. *Walter Kidde & Co., Inc.*

30—Safety system. Safety shutoff valves and supervising gas cocks give two-way protection to plants using gas and fuel oil. Bulletin 22 (12 pages) and supplement B22 (2 pages) describe these systems. *The North American Mfg. Co.*

31—Ladders, scaffolds. Specifications covering aluminum, fibrous glass, and wooden extension ladders and trestles are given in 32-page catalog. Includes staging, scaffolding accessories. *Newark Ladder & Bracket Co., Inc.*

32—Fire pumps. Bulletin 401 (6 pages) discusses vertical fire pumps in both oil- and water-lubricated models. Installation details, size and capacity charts, drawings. *Layne & Bowler, Inc.*

ELECTRICAL

33—Integral distribution centers. Catalog GEA-6928A (20 pages) discusses advantages of new centers that feature quiet, high-temperature dry-type transformers for applications to 5000 v. Ratings, weights, etc. *General Electric Co.*

34—Relays. Engineering data on 42 different series of relays are given in 16-page catalog (No. 60). Relays are divided into four major groups. Information in chart form for ready comparison between relays. *Potter & Brumfield.*

35—Drives. New half-wave, fractional-hp., electronic adjustable speed drives are described in 4-page bulletin (GEA-7208). Drives use silicon controlled rectifiers instead of tubes to supply power to motor. *General Electric Co.*

Turn the page

We identify here the industrial control system which will operate through an endless number of cycles without need for human direction, maintenance or servicing. The symbol for infinity in the equation shown above is obvious. The other symbol, the hysteresis loop defines the system as *magnetic* static control. The word "static" is used because there are no moving parts. Thus, under normal operating conditions the system never wears out. Customers have come to us for magnetic static control systems which are in use today from the automated lines of New England textile mills to automobile assembly lines in Detroit to the steel mills of the Argentine. If you, like they, wish to learn what operational statistics and costs *could* be by using magnetic static control for long life and dependability, will you please write us? Magnetics Inc., Dept. F-83, Butler, Pennsylvania.

INDUSTRIAL CONTROL EQUIPMENT

MAGNETICS inc.®

Visit Our Booth 2437 At The IRE Show

J-0738

For more facts Circle 533 on Reader Service Card

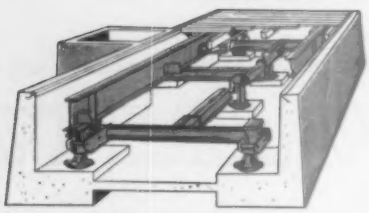
Cut Maintenance Costs

and SAVE MONEY

with MURPHY Cardinal

all-steel

SCALES!



Only *STEEL* can give you Structural Advantages Such as these!

- ★ HIGHER STRESSING QUALITIES
- ★ HIGH SHOCK RESISTANCE
- ★ GREATER STRENGTH
- ★ MODERN CLEAN-CUT DESIGN
- ★ LONGER LIFE
- ★ MORE ECONOMICAL —SERVICE FREE

Through the strength of all-steel construction, and the advanced simplicity of design, Murphy-Cardinal scales can offer lower installation costs *plus* lower maintenance costs!

Scales Can Be Custom Built For You —To Fit Any Need—Delivery in Most Cases Just 10 Days—NATION-WIDE SERVICE!

Capacities and platform sizes are available on request. All requests for information answered by return mail.

WRITE FOR DRAWINGS AND QUOTATIONS ON YOUR SCALE INSTALLATION

Cardinal SCALE MFG. CO.
Dept. 119 P.O. Box 151 Webb City, Mo. also Sacramento, California

FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

36—Motors. This 8-pager (2651) features 23 types of a-c and d-c standard and special motors. Summarizes characteristics; explains such modifications as C or D flanges, P base, vertical mounting, and others. *The Louis Allis Co.*

37—Super-Seal motors. Revolutionary stator insulations and full-protection features are discussed in Bulletin O5-51B9040B (12 pages). Photos show how motors can do jobs that no other open motor can handle. *Allis-Chalmers Mfg. Co.*

38—Cable suspension system. This 4-page catalog explains sheathing that's a modern, simple way of suspending heavy electrical cable. Needs no special equipment, tools, or job training. In several dimensions. *Perfect-Line Mfg. Co.*

39—Trolley busway. Bulletin No. 90 (40 pages) discusses steel-enclosed trolley busway electrification "60 System." Includes new heavy-duty trolleys, transfer trolleys, and standardized equipment rated at 60 amp. *Feedrail Corp.*

40—Transformers. This is a revised 24-page bulletin (GEA-6108D) with information on new Permalex transformer insulation system, which provides 12% higher continuous kva. loadability. Gives ratings. *General Electric Co.*

VALVES AND PIPES

41—Pinch valve system. Catalog 609 (12 pages) describes new system for opening and closing of pinch valves. System consists of one or more pinch valves with single automatically operated hydraulic pump. *Mine and Smelter Supply Co.*

42—Valves. Cast steel gate and globe valves for high-pressure, high-temperature applications are featured in 6-pager. Dimensions and weights; drawings and cutaway view of valve. *Walworth Co.*

Turn the page

I saved my company

$3,000 A MONTH

(Name of company furnished on request)

A simple device that automatically records minutes of busy and idle time of production equipment and lift trucks enables many department managers to make boasts like this.

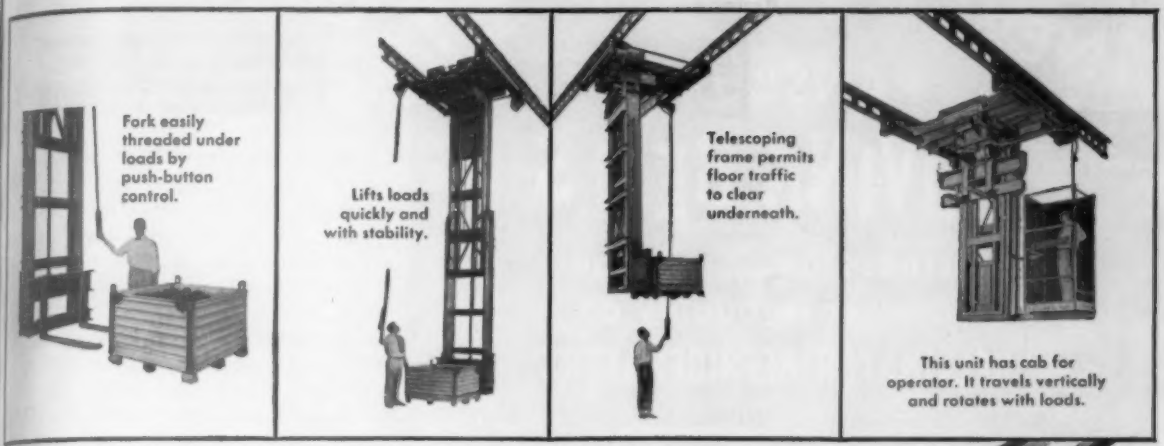
If a machine is idle, the Servis Recorder reports exactly when and how long the delay lasted. Records are permanent, easy to read, and easy to file. They enable you to improve scheduling, determine the cause of down time, and help you set rates.

Mechanical models attach to machines or lift trucks. Electrical models may be located remote from machines.

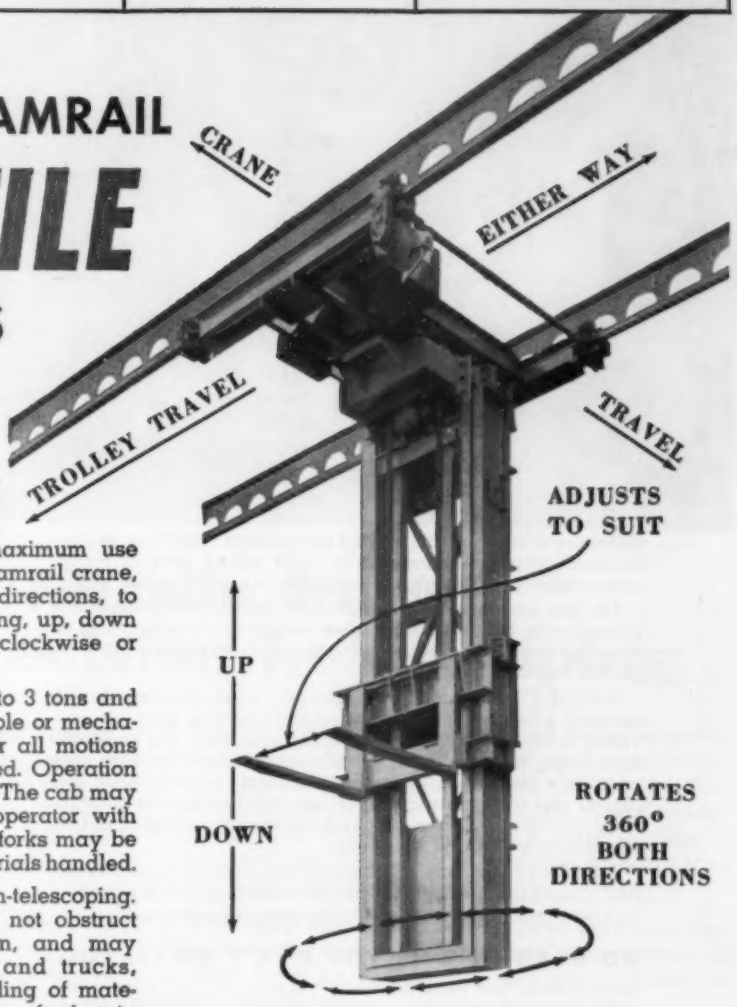
Prices of mechanical models are *as low as $40.*

Send for an illustrated folder with full information

SERVICE RECORDER CO.
1013C ROCKWELL AVE., CLEVELAND 14, OHIO


Fork easily threaded under loads by push-button control.
Lifts loads quickly and with stability.
Telescoping frame permits floor traffic to clear underneath.
This unit has cab for operator. It travels vertically and rotates with loads.

CLEVELAND TRAMRAIL
VERSATILE
STACKERS



THE maneuverability of Cleveland Tramrail stackers enables obtaining highly efficient handling coverage of a warehouse with maximum use of space. When on a Cleveland Tramrail crane, a stacker can be traveled in all directions, to front, rear or either side of a building, up, down and turned through a full circle clockwise or counter-clockwise.

Stackers are available for loads to 3 tons and lifts to 20 feet. They may be as simple or mechanized as the work requires. Any or all motions may be manually or power operated. Operation may be controlled from floor or cab. The cab may be traveled vertically to provide operator with maximum visibility of work. Lifting forks may be designed and spaced to suit the materials handled.

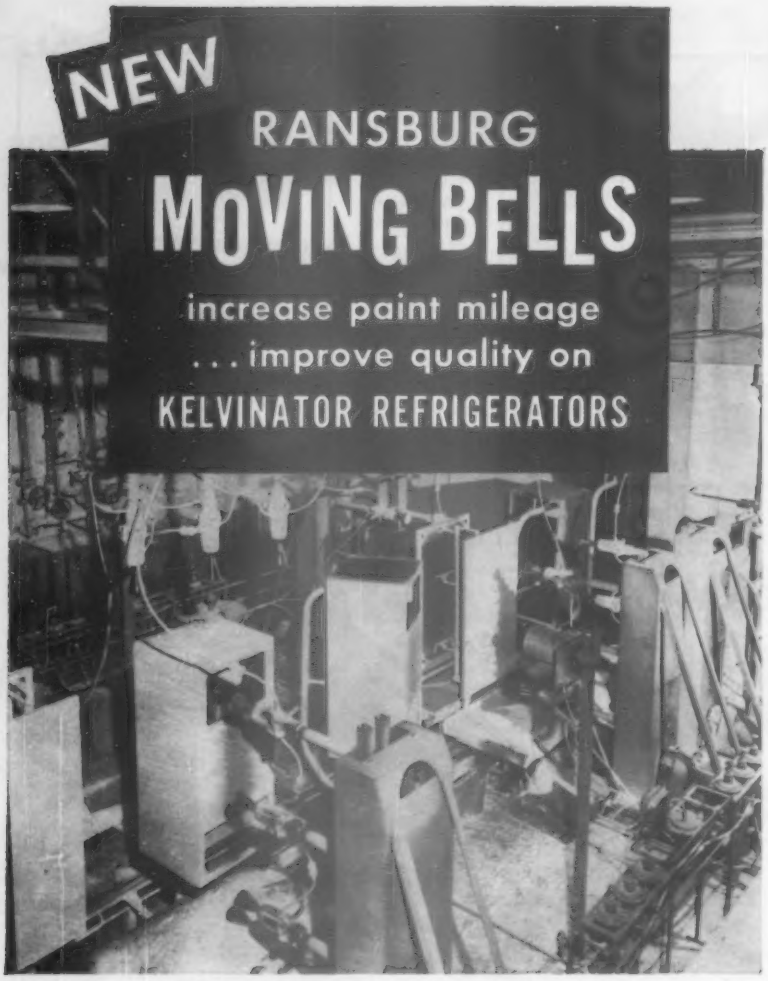
Design may be telescoping or non-telescoping. Telescoping type (illustrated) does not obstruct aisleways when in raised position, and may be traveled over railroad cars and trucks, thereby permitting the direct handling of materials to storage without need of transferring to other conveyances.

Cleveland Tramrail stackers and supporting cranes have much to offer. They can be designed to exactly suit your needs. Why not have a nearby Cleveland Tramrail engineer fill you in on the details.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION · THE CLEVELAND CRANE & ENGINEERING CO · 3254 E. 290 ST. · WICKLIFFE, OHIO



Ransburg's No. 2 Process moving bells—latest innovation in electrostatic painting—automatically paint mixed sizes of refrigerator cabinets and doors on Kelvinator's new finishing line.

On this job—first of its kind—limit switches re-position the reciprocating bells to accommodate various model sizes mixed on the same line. And, electric eyes selectively trigger the paint on and off between parts.

RESULTS? Automatic electrostatic spray painting—which replaced a battery of reciprocating automatic air guns—is providing Kelvinator with a beautiful, higher quality, and more uniform finish. Rejects, formerly a troublesome problem, have been practically eliminated. And, along with appreciable labor savings in this highly automated set-up, paint mileage is substantially improved . . . even bettering the savings indicated in pre-installation lab tests at Ransburg.

Like Kelvinator, other manufacturers of quality products will find Ransburg's moving bells the automation answer for production lines where batching of similar parts is impractical.

NO REASON WHY YOU CAN'T DO IT, TOO!

Want to know how Ransburg No. 2 Process can improve the quality of YOUR painted products—and at the same time—cut YOUR paint and labor costs? Write for our No. 2 Process brochure. Or, if your production doesn't justify automatic painting, let us tell you about the No. 2 Process Electrostatic Hand Gun which can be used in either conveyorized, or non-conveyorized painting.

RANSBURG

RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

43—Flexible hose. Bulletin No. 605 (12 pages) contains selection and installation information on hose and duct for moving air, dust, fumes, materials. Specifications, photos, index. *The Flexaust Co.*

44—Relief valves. Catalog sheets 1540A and 1541A announce new pilot-operated relief valves for machinery hydraulic systems. Two models—line and gasket-mounted—come in rated capacities of 20 and 50 gpm. *Parker-Hannifin Corp.*

45—Control valves. Bulletin 171 furnishes data on lever-actuated control valve for liquid level applications. With a maximum inlet pressure of 400 psi., valve is equipped for sensitive operation. Diagrams. *American Meter Co.*

46—Pipe, valves, fittings. This 16-page bulletin (No. 987) discusses the need for glassed-metal pipe and accessories in installations that require resistance to corrosion or contamination. Specifications, photos. *The Pfaudler Co.*

BUILDING

47—Structural steel welding. Here's a manual that describes successful ways to erect welded structures. Tells about savings in steel tonnage as a result of using welded connections in various structures. Photos. *Saxe Welded Connections.*

48—Pole buildings. Bulletin W-389 (4 pages) shows advantages of pole building designs. With pressure-treated pole construction concept, only grade and space limits lengths and widths of one-story buildings. *Koppers Co., Inc.*

49—Fire-retardant ceilings. New fire-protective acoustical lay-in system is discussed in 12-page illustrated booklet (AD99). The panels, about 2x4 ft., rest in an exposed grid system that will withstand intense heat. *Armstrong Cork Co.*

Turn the page

This Missile Part demands precision hole tapping

...gets it with Gardner-Denver "Tru-Thread" Tapper.

Here's the story: Rigid specs at Norris Division of Norris-Thermador Corp. call for tapping 3/16-20 Class 3 threads. It is vital that the depth of thread be held within .005". To meet these tough requirements, Norris-Thermador put a new Gardner-Denver "Tru-Thread" Tapper to work.

Highly Portable. This air-powered, positive-feed tool precision-taps clean, accurate threads in a hurry. One man can easily take it to the work—freeing expensive machine tools for other jobs, increasing efficiency.

"Controlled-pitch" lead screw feed prevents tearing or stripping of threads and tap breakage . . . enables this tool to produce Class 3 threads consistently. Single control starts completely automatic cycle. The Gardner-Denver "Tru-Thread" Tapper is a ready solution to precision tapping problems in hole sizes from No. 2 to 1" diameter. Request Bulletin 93-31.

Something else: Ask a Gardner-Denver Production Machines Engineer to show you how this versatile air tool can be incorporated into a *fully automatic* unit for precision, low-cost production.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

For more facts Circle 538 on Reader Service Card

CUT COSTS
WITH
LONGER-LASTING
PAINT PROTECTION

BRU-TECT
Chemical Resistant Epoxy
ENAMEL
NEWEST Achievement of
BRUNING PAINT
RESEARCH

- ★ Tough—wears longer!
- ★ Adheres better—all surfaces!
- ★ Resists abrasion—excellent on heavy foot-traffic areas!
- ★ Protects machinery and equipment indoors or outdoors!
- ★ "Eye-rest" colors created especially for factories!
- ★ Well-painted plants mean lower accident rates!

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FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

50—Movable interior walls. Product details and specifications, suggested applications are given in 4-color, 32-page brochure (AIA 35-H-6). Also describes how walls may be taken down and re-erected easily. *The E. F. Hauserman Co.*

51—Grid systems. Brochure 2a/ShL is a revised 8-pager that describes grid system of reinforced concrete construction. System uses steel grid domes in 2-ft. modules—said to speed building time, save costs. *Grid Flat Slab Corp.*

52—Rolling doors, partitions. Design details and specifications on steel and aluminum service doors and wood side-coiling partitions are given in Catalog 6101 (20 pages). Has data on other doors, grilles, components. *The Cookson Co.*

AUXILIARY

53—Electric heating equipment. Specifications and illustrations of heater bands, air heating elements, and other products are contained in a catalog supplement (CS-600, 24 pages). Includes two handy indexes. *Edwin L. Wiegand Co.*

54—Air filter. Bulletin B-1400-8 (8 pages) gives construction, selection, and installation data on redesigned Roll-Kleen air filter. Four models; automatic drive or manual operation. *Farr Co.*

55—Water systems parts. This 84-pager, said to be one of the most complete parts lists available, covers water systems and utility pumps. Explains how the list ties in with the company's 24-hour parts service. *The Deming Co.*

56—Diesel engines. Catalog BU-718 is an 8-pager titled "A New Kind of Diesel Work Power." Performance curves and charts, plus cutaway drawings of components, explain two models in the 100-210 hp. class. *Allis-Chalmers Mfg. Co.*

Turn the page

NOW
WILKERSON
SAF-T-BOWL
OBSOLETES
plastic bowls and bowl guards on air line products!

On filters and lubricators . . .
MAXIMUM VISIBILITY
of water and oil levels.

Exclusive design allows full 230° visibility and bowl can be rotated so gauge is in any position for easy, safe viewing. Thin metal bar in center protects heavy pyrex sight gauge from impact without interfering with visibility.

EXCLUSIVE!
REPLACEMENT SAVINGS!
WILKERSON SAF-T-BOWL is interchangeable with existing plastic bowl units.

EXCLUSIVE!
FURTHER SAVINGS!
Sight glass can be ordered separately and installed on existing metal bowl units.

***EXCLUSIVE!* ALL SIZES**
Available on ¼" to 2" PT. Filters and Lubricators.

Eliminates the hazards of bursting bowls.

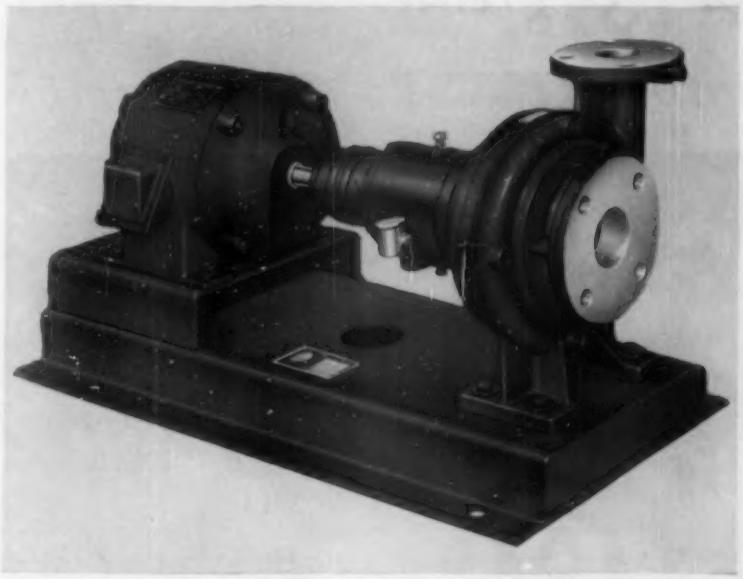
WRITE TODAY for complete information on the NEW Wilkerson SAF-T-BOWL contained in Circular #1041

WILKERSON CORPORATION

Dedicated to keeping the NEW in pNEUmatics
1634 W. Mansfield, Englewood, Colorado

prove it to yourself!

...THAT THE SERIES 1510-B CENTRIFUGAL PUMP OFFERS MORE



1510-B FEATURES

- Vertical split case design—solid-type volute can be left in pipe line when servicing pump.
- Removable bearing frame assembly—can be lifted out without disturbing piping or motor leads.
- Interchangeable bearing frame assembly—one unit fits a wide range of pump sizes.
- Positive oil lubrication with visual check.
- Anti-friction *roller bearings.*
- Mechanically balanced impeller. Balancing chamber and pressure relief holes in impeller reduce thrust to a minimum—lengthen pump life.
- Leak-proof "Remite" seal. Carbon seal ring faces on harder-than-glass Remite floating seat. Assures long, trouble-free life.
- Special alloy steel shafts, superfinished, oversized.
- Performance guaranteed—100% pre-tested at the factory for conditions of head and capacity specified.
- Choice of all-iron, bronze-fitted, or all bronze.
- Capacities to 2000 GPM, heads to 420 ft.

Why not get your full dollar's worth of pump value...send today for selection data on the B&G 1510-B Centrifugal Pumps.

Check any centrifugal pump of comparable capacities against B&G 1510-B Pump features!

B&G Series 1510-B Centrifugal Pumps are distinguished by all the features listed at left. To compare any other pump with the 1510-B, place check marks in the red boxes beside the features also offered by the competitive pump.

We'll wager you'll wind up with quite a number of unchecked boxes!

The balanced design of this *vertical split case* pump is definite assurance of smoother, more efficient performance and longer life. Its design enables the bearings to withstand loads far in excess of those produced by any pump and motor combination in the 1510-B series ...an added feature of dependability.

NOW AVAILABLE IN "C" SIZE UNITS
UP TO 75 H.P.
2000 GPM, 170 feet, 1750 RPM,
3″—4″—6″—8″ discharge connections

BELL & GOSSETT
COMPANY
Dept. GO-13, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

When you install a new lighting system or modernize your old one... *you get greater light output with* **RADIANT** *lamps*

The symbol of better lamps.

61-14

RADIANT MERCURY LAMPS increase light output at the working level. Made of "Pyrex" brand glass that is unaffected by dirt and corrosive conditions, Radiant Lamps last longer. Reduce maintenance cost. Consistently maintain uniform lighting. When highest quality is a "must," whether in original installations or in re-lamping, use Radiant Reflector Incandescent or Mercury Lamps. For further information about high bay lighting write, or phone Les Deutsch at BIgelow 3-6850.

RADIANT LAMP CORPORATION
300 JELLIFF AVENUE • NEWARK 8, N. J.

For more facts Circle 542 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 222

For more about these items, circle item numbers on Reader Service Card next to back cover.

57—Hydraulic power units. Application and other information on 12 single-pump, 15 double-pump, and 10 continuous booster models is given in 6-page bulletin (0980-B1). Tables. *Hannifin Co.*

58—Roof exhaust fans. Two 4-pagers: No. PC-101 describes high-capacity, low-velocity centrifugal fan that's 40% lower in height. No. SS-101 covers fan that exhausts air from flat and pitched roof buildings. *Davidson Fan Co.*

INSTRUMENTS AND CONTROLS

59—Timing motors, devices. Catalog No. G-1328 (8 pages) describes motors and devices for all your time and torque control requirements. Includes dimensions and design characteristics of these compact electric units. *General Time Corp.*

60—Sound measuring instruments. This 20-pager is a comprehensive booklet that discusses measurement of sound, noise, and vibration. Gives specifications and other data for each instrument. Curves show frequency cycles. *General Radio Co.*

61—Numerical control systems. Catalog No. 308 has 16 pages covering contouring controls and positioning control systems. Provides features, specifications, other details; lists accessories. Application photos. *The Bendix Corp.*

62—Solid state alarm system. This 4-page brochure presents a low-cost limit monitor for use with thermocouples, resistance thermometers, thermistor, and strain gauge inputs. Installation, warranty data. *San Diego Scientific Corp.*

63—Telemetering equipment. Basics of transmitter and receiver operation in a time-duration impulse system are discussed in 8-page bulletin (230.20-2). Lists applications. Photos. *B-I-F Industries.*

Now! Skil Roto-Hammers drill 3½" holes in reinforced concrete

using new percussion carbide tipped Skil Core Bits!

There are plenty of good reasons why the Skil Roto-Hammer is sure to be the world's largest selling hammer again in 1961! But one of the foremost is Skil's new core bits.

These hollow core, percussion type carbide bits increase the range of the Model 726 Roto-Hammer from 1⅛" up to 1½" and the Model 736 from 2" up to a full 3½"!

What's more, they drill right through stubborn steel reinforcing rods—an impossibility with solid carbide bits or star drills.

This means that the hammer that already drills masonry holes at the *lowest cost per hole* and with *lowest hammer maintenance*, has tremendous added versatility.

Ask your Skil distributor for a demonstration soon. Look under "Tools-Electric" in the Yellow Pages. Or write: Skil Corporation, Dept. 117C, 5033 Elston Avenue, Chicago 30, Illinois.

Skil Roto-Hammers combine power rotation with powerful hammering to drill holes in masonry (¼" to 3½") 5 to 6 times faster than ordinary electric hammers! Lowest maintenance—no springs to break.

SKIL . . . and SKILSAW POWER TOOLS

For more facts Circle 543 on Reader Service Card

Works on the railroad and in the plant, too

Although developed originally as a lubricant for rail trackage, Mexacote is especially effective for heavy industrial use. A quick-drying, nontoxic graphite lubricant, this new material can be applied to either wood or metal areas.

The lubricant is compounded from a blend of fine Mexican graphite (hence the name) and special oils. The substance is easily applied with brush, swab, or spatula after it is thinned with turpentine, naphtha, or oleum spirits.

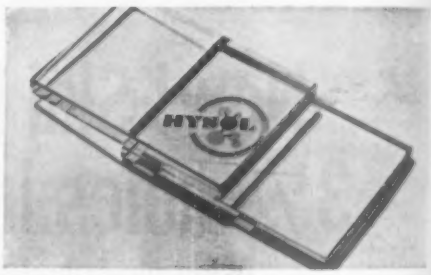
Packaged in standard one-gallon cans, Mexacote gives a tenacious, durable coating with maximum lubricating action. *United States Graphite Co.* (Circle 195)

196—Glass cloth, covered with an aluminized, silicone-rubber coating, provides protection of equipment and personnel from high radiated heat. In one test, the material effectively protected an electrical cable placed 3 feet from jet exhaust blast. *Minnesota Mining & Mfg. Co.*

197—Vibration isolation pad, using high density fibrous glass, isolates shaking, eliminates need for lagging machinery to the floor. Guaranteed not to creep. Kinetic pads come in sheets and are prescored for fast, easy cutting to size. *Consolidated Kinetics Corp.*

198—Adhesive-coated board (corrugated or chip) is pressure-sensitive and allows fast, secure positioning of small parts for shipping or storing. Available in variety of shapes and sizes, including diecuts. Boards come with protective liner. *Pres-On Products.*

See-through adhesive holds on tight



With this new material, high-strength bonds of glass-to-glass and glass-to-metal can be made without impairing the optical clarity of the glass. Hysol Kit 0151 is a resilient epoxy adhesive with tensile shear value of 2400 psi. in temperatures from 50 to 150 F.

Both resin and hardener are packaged in flexible tubes for easy handling. To apply, squeeze out equal amounts and mix. Resin and hardener appear cloudy when first mixed, but turn to clear film after one hour at room temperature. *Hysol Corp.* (Circle 199)

New spray way to dustless sweeping

Press the Gripdust spray-can button and you have a super duster-upper where once a mere mop stood. This new aerosol spray enables a mop or cloth to pick up dust as if magnetized. It dries instantly as applied. The mop allows dustless sweeping; the cloth is used on vertical surfaces and small horizontal surfaces.

Available in a 16-oz. can, Gripdust spray is said to have a refreshing aroma. A special detergent ingredient facilitates laundering of mops and cloths once the dusting job is completed. *C. B. Dolge Co.* (Circle 200)

Turn the page

How 43 Textile Mills Reduced Baling Costs 20%-35% with AVISTRAP® CORD STRAPPING

Replaces Metal. AVISTRAP in ½", ⅝", ¾" widths replaces identical width metal strapping on grey goods bales weighing up to 800 lbs. Coil mounting and handling method devised by Selta Corp., AVISTRAP distributor in Charlotte, N. C., eliminates costly and time-consuming precutting needed with metal strapping. Baling press operator simply preloads strap around bale, ties ends, and releases pressure. Baling with AVISTRAP is faster, or equal to speed of metal strapping.

Fully Proved. More than 50,000 AVISTRAP-strapped bales have now been shipped by the 43 mills using this method. In addition to overall savings of from 20% to 35% in shipping room costs, users report AVISTRAP eliminates rust damage, is favored over metal by customers for safety, and convenience of easy removal from bale, easy disposal by normal waste handling methods or by burning.

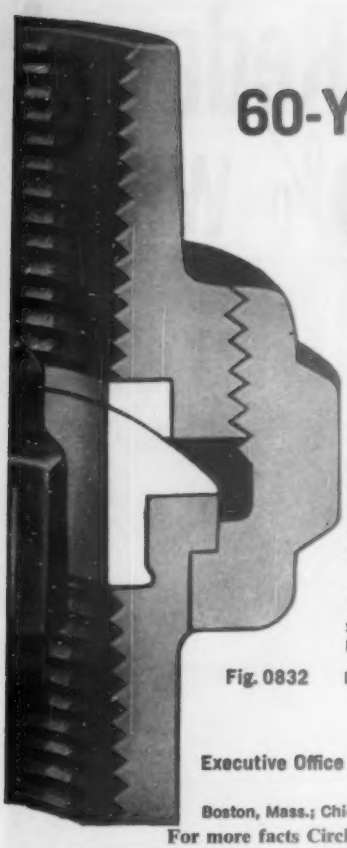
AVISTRAP® CORD STRAPPING*

How do your packaging needs size up with these four advantages? **Toughness**—AVISTRAP will absorb impacts that snap metal strapping. **Safety**—AVISTRAP has no sharp edges, won't lash out with jagged ends. **Lightness**—21-lb. coil of AVISTRAP carries yardage equal to 100 lb. of comparable width metal strap. **Convenience**—Dispensing equipment costs little, is easy to use. Tensioning and sealing require little skill or training. A range of AVISTRAP sizes, all tools and accessories, and tool service are available through local distributors in all major industrial areas. Contact the district office nearest you (listed below) to arrange for a demonstration in your plant. To request application information, write directly to Industrial Packaging Department, American Viscose Corporation, describing your strapping problem.

*Patents pending.

AMERICAN VISCOSE CORPORATION, INDUSTRIAL PACKAGING DEPT., 1617 PENNSYLVANIA BLVD., PHILA. 3, PA.

District offices: Atlanta, Ga., Boston, Mass., Charlotte, N.C., Chicago, Ill., Columbus, Ohio, Dallas, Tex., Denver, Colo., Los Angeles, Calif., New Orleans, La., New York, N.Y.



60-Year Guarantee Backs Dart Unions

For over 60 years every Dart Union has been backed by the firm GUARANTEE that "if one should leak through, we will give you two". Less than 1 in every 100,000 has proven faulty.

The extra wide bronze seats, ground on specially designed machines to a true ball and socket joint, are swaged under heavy pressure into air-refined malleable iron bodies. They come apart readily and remake repeatedly without excessive wrenching — without jamming. They are the reason that Darts may be used over and over again.

Sizes: ⅛" thru 4 inches
Pressure ratings: ⅛"-2"— 300 S.W.P., 600 W.O.G.
2½"-4"— 250 S.W.P., 600 W.O.G.

Fig. 0832 Darts also available in the all-iron construction.

THE **Fairbanks** COMPANY
Executive Office: 393 Lafayette Street, New York 3, New York
Branch Offices:
Boston, Mass.; Chicago, Ill.; New York, N.Y.; Pittsburgh, Pa.; Rome, Ga.

For more facts Circle 545 on Reader Service Card

NEW MAINTENANCE IDEA

Here is the proven practical way to motorize maintenance departments

Industries switch to labor-saving PRIME-MOVER F-10 and step up maintenance efficiency three ways:

1. Doubles or triples maintenance man's productivity by transporting him to the job. An F-10 gets him there at the top speed permissible under normal plant conditions!
2. And he brings the needed materials with him. An F-10 hauls pipe, lumber, fixtures, motors, or odd shaped materials!
3. Almost every maintenance job requires tools and equipment to do the job. An F-10 carries hand tools, power tools, ladders, welding equipment, or special tools.

Write for job data on how this truck can be one of the best investments your plant has ever made. Sold by industrial truck distributors. The Prime-Mover Co., Muscatine, Iowa.

PRIME-MOVER

MILLWRIGHT & PLANT ENGINEERING—Heavy loads of odd sizes and shapes fit on platform with room for tools to do the job on arrival.

PIPE FITTER & ELECTRICAL—This 18 sq. ft. of deck area carries the man, the material, and the equipment in one operation.

FACTORY / MATERIALS NEWS

Begins on page 238

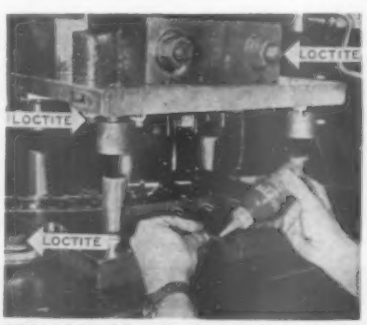
For more about these items, circle item numbers on Reader Service Card next to back cover.

201—Anti-rust paint can be applied right over rusted metal to renew finish. Instead of just covering rust, this durable paint is said to "penetrate rusted layer right down to the base metal." Seals against further corrosion. *Paramount Industrial Products Co.*

202—Positive sealant, called Oyltite-Stik, seals transformer oil leaks that develop through cracks or pinholes in welds or joints. Maker says sealant can repair many leaks while transformer is in service. Unaffected by temperature or oil. *Westinghouse Electric Corp.*

203—Fabricated hardboard, called Caneboard, is strong, durable, presmoothed for painting on both sides. Citing its unusual perforation pattern, maker recommends it for use as room partitioners, sliding doors, paneling, acoustical ceilings. *Hardboard Fabricators Corp.*

204—Acrylic coating, similar to the kind used in automobile paints, is said to double the life of fiber glass panels. The transparent coating preserves the color stability and light transmitting capacity of the original fiber glass panel. *Structoglas Inc.*



205—Liquid plastic sealant locks cap and shoulder screws in place in press tools. Once Locktite is applied, says maker, bolts become oblivious to all shock and vibration. Since sealant is applied cold from a tube, no heat-softening of screw is required. *American Sealants Co.*

Turn the page

For more facts Circle 546 on Reader Service Card

With Texas' TEMCO it's *Acme* packaged chillers time and time again

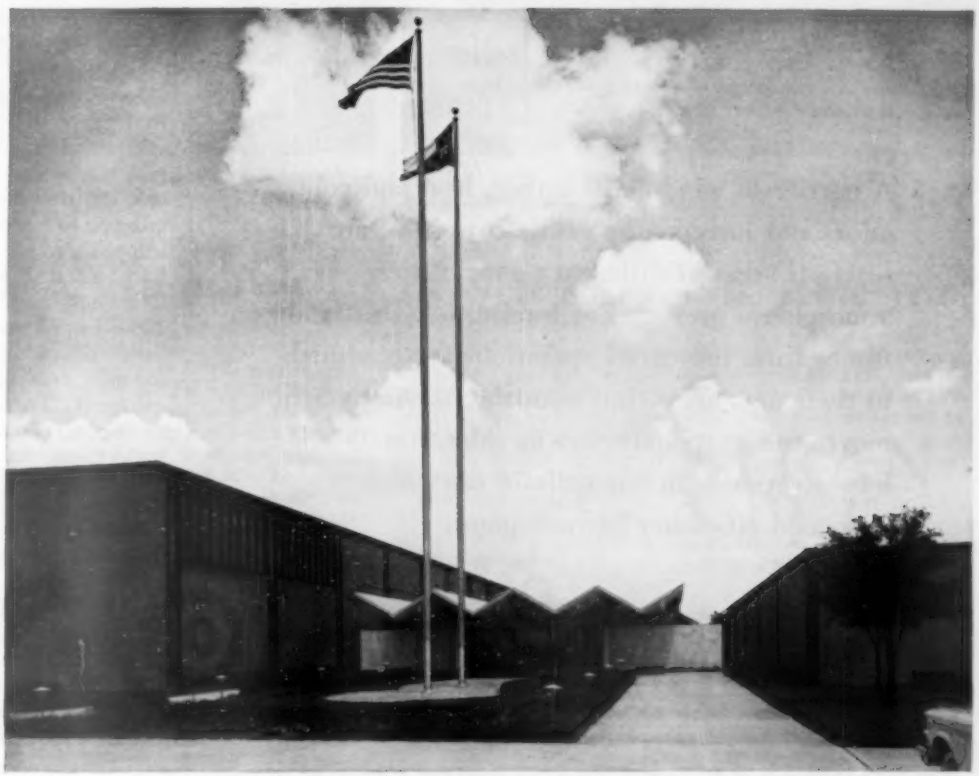
Flow Cold packaged water chillers—
3 through 30 tons

Started back in '51 . . . TEMCO Aircraft Corporation, Dallas, purchased two Acme packaged chillers to solve a problem in their spot welding operations. The problem? . . . the copper contact points of the spot welders melted and distorted without fusing the steel into an acceptable bond. The solution? . . . to circulate *cold* water through the hollow copper points to keep them cool, thus allowing the electrical charge to pass through the steel and weld without melting the copper.

To supply the cold water, Acme chillers were purchased . . . because they offered easy-to-install, space-saving compactness, high capacity efficiency, factory certified performance reliability. Was TEMCO satisfied? Well, as their manufacturing facility expanded and they needed additional chillers for spot welding and other processing operations, they came back to Acme *time and time again* . . . in July '53, March '55, June '57 and August '58, to be exact. What better evidence of customer satisfaction?

Acme. INDUSTRIES, INC.
JACKSON, MICHIGAN • GREENVILLE, ALABAMA

Manufacturers of quality air conditioning and refrigeration equipment since 1919



Administration and
Engineering Building
TEMCO Aircraft Corp.
Garland, Texas

For more facts Circle 547 on Reader Service Card

the CLOSED door that's always OPEN

HOPPER PAPER COMPANY, TAYLORVILLE, ILLINOIS.
Fire extinguisher fumes, simulating wind, are unable to penetrate the American Air Curtain

A barrier to wind and weather, heat and cold, odors and insects—the gentle curtain of air seals off areas of different temperatures, atmospheric pressures or humidities. Dust and fumes from industrial operations are confined to their own areas, but even the heaviest traffic moves easily... safely. Let us show you how an American Air Curtain can mean increased efficiency in *your* plant.

PEOPLE AND PRODUCTS MOVE THROUGH THE CLOSED DOOR THAT'S ALWAYS OPEN

AMERICAN AIR CURTAIN
A DIVISION OF UNIVERSAL MATCH CORPORATION
ST. LOUIS 35, MISSOURI

FACTORY / MATERIALS NEWS

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

206—Moisture repellent protects metal, plastic, ceramic parts from corrosive effects of moisture. Called Calfonex, the product is sprayed directly from the can. It's said to penetrate to bare surface, removing rust and forming continuous molecular seal. *The Falcon Corp.*

207—Vinyl - surfaced wallboard (gypsum based) is available in a variety of pastel colors. Its slightly-textured, linen weave finish can be cleaned of grease, crayon or oil stains with a damp cloth. Eternawall comes in the standard ⅜ inch thickness. *Bestwall Gypsum Co.*

208—Laminated hardwood flooring for trucks and trailers is said to offer substantial savings in installation and maintenance. Made of selected oak, the new flooring provides covering up to 12 feet wide. Boards are shipped pre-cut to exact specifications. *E. L. Bruce Co.*

209—Liquid surface seal for plant floors offers one-coat effectiveness for most areas, three coats for critical areas. For use over all mastic or asphalt floors, Jennite J-16 is impervious to water; resists oil, gases, fumes, etc. Sparkproof. *Maintenance Inc.*

210—Alkaline cleaner called Oakite RR is just right for "really rugged" cleaning jobs. Designed to remove burned-on oil, and heavy grease from railroad equipment, it's well-suited for heavy-duty use. Effective on all metals except aluminum, zinc. *Oakite Products, Inc.*

Turn the page

Light & Power Utilities' new 112,000-sq.-ft. quarters in quality Stran-Steel were built under Mississippi's "Balance Agriculture with Industry" Program. Architects: Lee, Brumfield and Riggens, Jackson, Miss.; Stran-Steel Contractor: Dixie Metal Buildings Co., Memphis.

Quality that lowers costs *every day of the year*

Working to fixed costs on tight budgets? Then see how Light & Power Utilities Corporation got space, style and savings in their new Stran-Steel plant in Olive Branch, Mississippi! This lighting equipment manufacturer chose Stran-Steel to get maximum clear floor space to house bulky painting and metal-working facilities and plenty of leeway for future expansion, too. Yet Light & Power's Stran-Steel structure cost them only $2.23 per square foot. It was erected in just 100 working days—about half the time conventional construction requires! Stran-Satin walls and roof panels, color-coated at the factory, saved $12,000 in painting costs. Complete insulation, so easily and economically installed in any Stran-Steel structure, cut gas heater requirements by 40%, lowering costs an additional $10,000. And the owners will save $5,000 every year in heating, as much as 15% in air conditioning costs! Your local Stran-Steel dealer will be happy to show you how you can have quality and lower costs, too. He's listed in the Yellow Pages under STEEL BUILDINGS or BUILDINGS, STEEL. Or mail the handy coupon below.

STRAN-STEEL

Buildings for Modern Business

CLIP COUPON AND MAIL TO STRAN-STEEL CORPORATION, DEPT. F-8, DETROIT 29, MICHIGAN

Please send complete literature on Stran-Steel Buildings in Stran-Satin Color. I'm interested in a building approximately _____ ft. by _____ ft. to be used for _____

Name _____ *Title* _____

Company _____ *Phone* _____

Address _____ *County* _____

City _____ *Zone* _____ *State* _____

STRAN-STEEL IS A DIVISION OF **NATIONAL STEEL CORPORATION**

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If we don't stock the plier-type tool you need

we'll make it for you

Using an exclusive cost-saving system of matched components, Sargent will design and build the plier-type tool you need for production, product installation, or maintenance. Sargent "Specials" cut, crimp, hold, shape, or perform a dozen other operations.

And Sargent is an experienced hand at making both "special" and standard hand tools. Variations of our compound action or standard action pliers are used by major companies all over the country. Available completed or with blank jaws and frames, you'll find the Sargent system is the answer to the purchase of quality special purpose hand tools in both large or small quantities at economical prices.

For additional facts send for Sargent's Hand Tool Catalog and Case History book. Write: Sargent & Company, Hand Tool Division, New Haven 9, Connecticut

hand tool division
SARGENT™

For more facts Circle 550 on Reader Service Card

Begins on page 238

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS LITERATURE

211—Asbestos coatings for fireproofing, insulation and acoustical control are treated in this illustrated folder. Tables show light reflectance, fire hazard classification, sound absorption, fire retardant ratings. *Emjay Maintenance Corp.*

212—Metal Buyers Guide is a 16-page, illustrated directory that includes information on: aluminum, brass, bronze, copper, nickel, silver, rhenium, stainless steel, and zirconium. Lists mill products and specialties. *Chase Brass & Copper Co.*

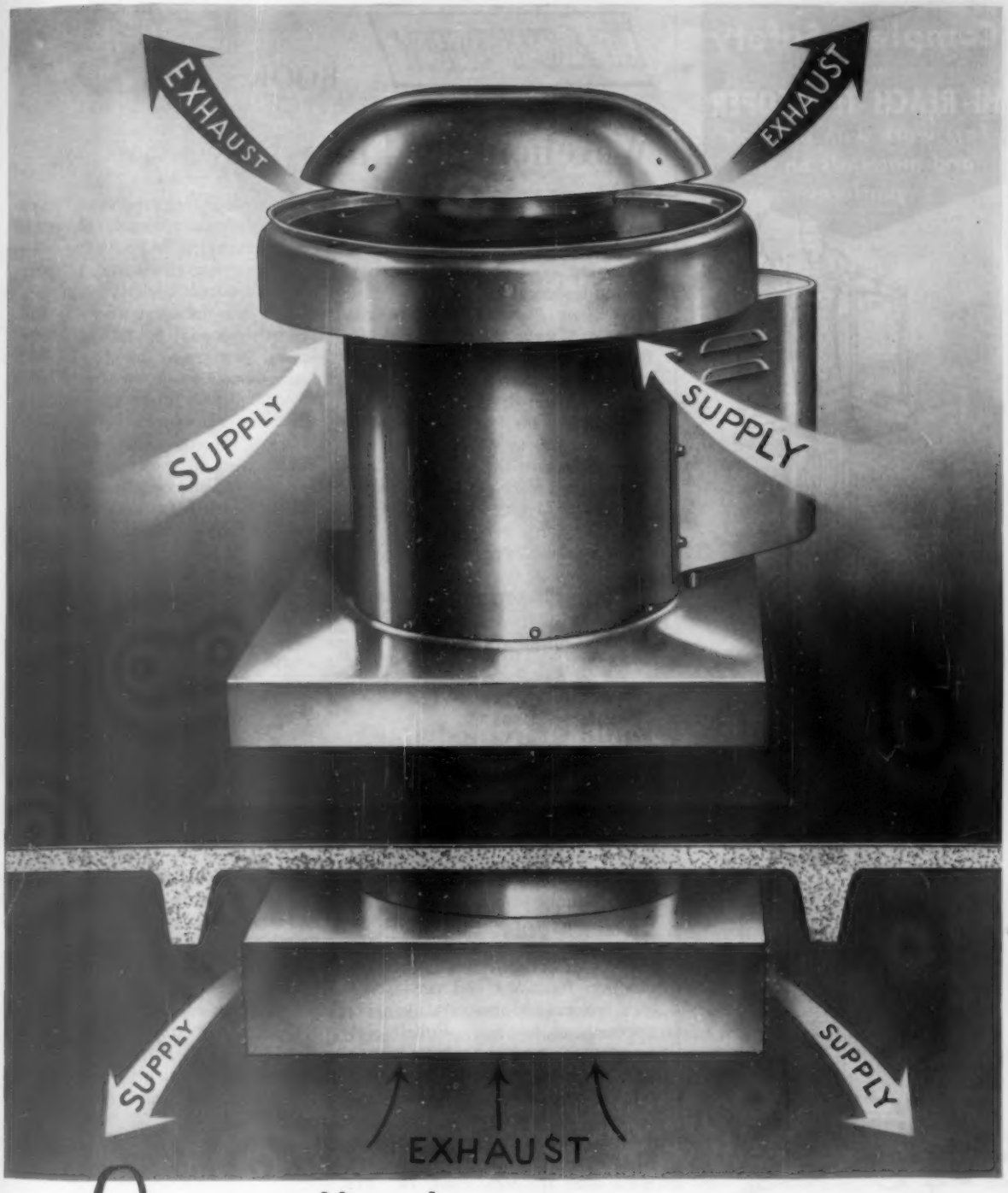
213—High-heat paint with an aluminum base that can be used for many applications previously "unpaintable" is reviewed in this three-page bulletin (No. 1206). Called Heat-Rem H-120A, the paint is unaffected by severe heat. *Speco, Inc.*

214—Pressure-sensitive tapes (paper), their uses in industry and their physical properties are described in new 6-pager. Illustrated, folder also examines several automatic tape-dispenser machines. *Minnesota Mining & Mfg. Co.*

215—Silicone rubber selector chart (CDS-145C) contains comprehensive data on applications, properties, and specifications. To help you select proper elastomer, compounds are divided into four general classes. *General Electric Co.*

216—Panel-type air filter that uses Dynel, a strong fiber with rough surface, stops and holds unusually large quantities of dust. Bulletin A1 (4 pages) describes it. *Union Carbide Development Co.*

217—Prestressed concrete qualities and applications are described in this 20-pager (MPR-P-13). Discusses benefits of the forming process called Pozzolith, and includes 16 studies of prestressed concrete projects. *The Master Builders Co.*

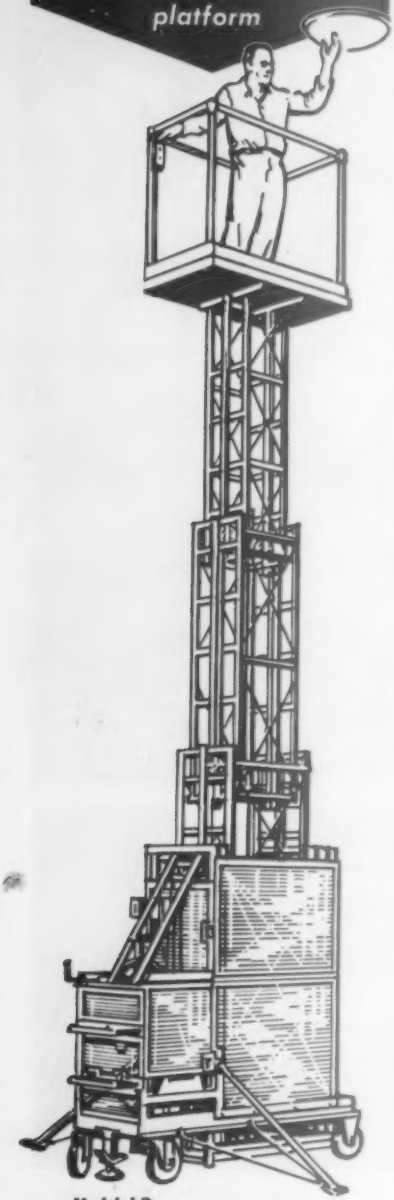


One impeller does it

You get both air supply and exhaust simultaneously with the new Clarage TWINALATOR*. Unique, superior dual function air handling for all types of buildings. Definite money-saving advantages: Requires only one opening, one motor, one drive, one starter. No make-up air unit necessary. Applications unlimited — well adapted to closed or semi-closed systems. Can be provided with heating coils and filters. Write today for Bulletin 552. CLARAGE FAN COMPANY, Kalamazoo, Michigan. Clarage sales engineering offices are located in all principal cities.

*Patented Trademark

Complete Safety
with a
HI-REACH TELESCOPER
Fast work with all tools and materials on the platform



Model LB
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$1510.00 up

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Lift 10'9"—$370.00
Lift 15'0"—$400.00

Custom built Hi-Reach Telescopers up to 100 ft.
Write for complete catalogue

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ECONOMY ENGINEERING
4527 West Lake Street, Chicago 24, Illinois

FACTORY BOOKS

Warehousing know-how

A helpful volume for both the experienced and neophyte, this new book is a useful tool in planning and managing a warehouse. Written in a non-technical style, *Warehouse Operations Planning and Management* can serve as a textbook for those learning warehouse operations as well as a refresher course for those experienced in the field.

As one of the first books devoted completely to this topic, it offers a good picture of the many problems encountered in layout and operation of storage facilities. The reader is taken through a step-by-step analysis of warehouse operation—from a logical layout of storage space to operating procedures and controls. Diagrams and examples of actual problems are helpful.

As with any book, a price is paid here for depicting progress. For example, the most recent developments are not included. Also, in the otherwise complete discussion of pallet and pallet rack design, the nomenclature does not agree with standards recently adopted by rack manufacturers. Nor are the handy pipe-and-fittings racks of recent design mentioned. But these are omissions that can be expected from most books in a fast-changing field.

Chapters on selecting lift trucks and other equipment are complete. Also valuable is a chapter on storage aids for small lots and irregularly shaped materials.

Warehouse Operations Planning and Management, by Andrew J. Briggs. John Wiley & Sons, Inc., 440 Park Ave., New York 16. 303 pages. $8.50.

Build or remodel?

Here's a book of plant building ideas for industrial managers and engineers as well as architects. The author, a practicing architect, presents observations and examples collected from the United States, Great Britain, and Germany.

Industrial Architecture provides information about all the technical aspects of industrial buildings, including: functions and needs; utilities, services and structural elements; appearance; location. Equally important, the author analyzes trends, such as industrial parks and automation, and discusses their impact on plant design.

Industrial Architecture, by James F. Munce. F. W. Dodge Corp., 119 West 40th St., New York 18. 232 pages. $14.75.

Labor reference book

Did you know that the Taft-Hartley Act has a provision against "featherbedding"? Or that 12 states have labor relations acts that prohibit unions from engaging in secondary boycotts or mass picketing? How has our Gross National Product increased since 1929? At what rate?

These are only a few of the thousands of important items to be found in a revised edition of *The American Workers' Fact Book.*

Containing hundreds of useful charts and tables, the book is a prime source of information on workers and working conditions in the United States. Covers such subjects as the labor force, labor market, industrial safety, minimum hours, and labor-management relations.

The American Workers' Fact Book. U. S. Department of Labor. Supt. of Documents, Washington 25, D. C. 395 pages. $1.50.

Measuring managers

If you have been looking for practical suggestions on establishing performance standards for your managers, try this book. *Managerial Performance Standards* is based on the author's 22 years experience as a consultant on management.

This down-to-earth approach in setting performance standards assumes active cooperation between manager and his boss. Recognizing

HOW WELL DOES YOUR PRODUCT IDENTIFY ITSELF?

Can you learn something about identifying your product or package from the lobsterman? Listen: he makes his buoys all the same shape, paints them in a design to suit his fancy (always in the same color), and carves his license number in the top. Every other lobsterman then knows which buoys are his and which aren't.

How simple, sure and *economical* is the marking, labeling, stamping or color coding you're using? When a customer picks up your product, something should tell him what it's for . . . what its advantages are . . . what it fits, works on or goes with . . . that you made it . . . and nudge him on to buy. Ideally, the marked or stamped message ought to do this as long as the product lasts (the lobsterman still hasn't licked this one; he repaints every spring).

How do you know whether your products are saying all they should — and at the *lowest* possible cost? Put yourself in the purchaser's place and see whether you get the information you want. Then look at the time and money you spend identifying them. There's an excellent chance you can improve the quality *and* save some money. We can help you do both.
Markem Machine Co., Keene 18, N. H.

HELPING YOUR PRODUCT SPEAK FOR ITSELF

MARKEM

that organization charts and job descriptions are no substitute for active participation, the author believes that the major responsibility of all managers is direction of the people reporting to them.

By using this approach—a mutual examination of both the "what" and "how well" of the manager's job—Virgil Rowland shows how simple it is to create meaningful performance standards for any manager.

Managerial Performance Standards, by Virgil K. Rowland. American Management Association, 1515 Broadway, New York 36. 192 pages. $5.25. (AMA members: $3.50.)

Electrical Design Details can be invaluable for the plant engineer who must make (or approve) detailed electrical construction drawings. About 40% of the text is devoted to circuit diagrams and dimensional drawings typical of factory problems; another 40% deals with various problems in commercial buildings and offices.

The book isn't a complete treatise on all industrial electrical construction details (which would need a file cabinet to hold them), but most plant engineering staffs will find invaluable a good share of the book's 450-odd drawings, tables, and diagrams. The problems covered include everything from cable-splicing drawings to pole-top construction details to exploded views of channel-supported fluorescent luminaires. Indexed.

Electrical Design Details, by Joseph F. McPartland and William J. Novak. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36. 230 pages. $8.50.

Engineering and Technical Conventions lists nearly 700 meetings, sponsored by approximately 170 groups, scheduled for the period 1961-65. It includes meetings with technical and management agendas. In addition to a chronological listing of meetings, there are indexes of societies, general subjects, and locations of meetings.

Engineering and Technical Conventions. Deutsch & Shea, Inc., 230 West 41st St., New York 36. 41 pages. $4 single copy including a Fall supplement.

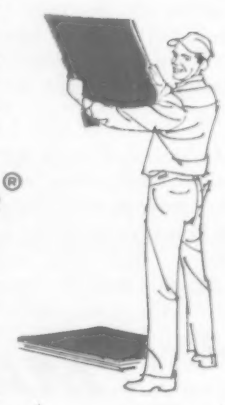
Interior view of Goodyear plant shows how Structoglas glazing transmits ample light, tinted and diffused by panels' "Softlite Green" color.

GOODYEAR glazes with Structoglas

For Free Natural Light without Breakage

Why did Goodyear use Structoglas for glazing in its new Akron Rim Plant? These corrugated, shatterproof fiberglass panels install quickly, eliminate glass breakage and periodic painting and puttying of sash – form a weather-tight source of natural light.

Structoglas is press-molded of acrylic polyester resin, resists breakage, fading, discoloration and erosion. No painting needed, because the "Softlite Green" color is molded in the panel. And Structoglas "SE" panels, used in the Goodyear plant, are *self-extinguishing*—approved by Underwriters' Laboratories and Factory Mutual. You can improve lighting and eliminate breakage with Structoglas, the panel that practically pays for itself.



structoglas®

WRITE TODAY for Goodyear Case History and new Structoglas Glazing folder (SL-1). Structoglas Inc., Dept. 303, Cleveland 20, Ohio.

5902

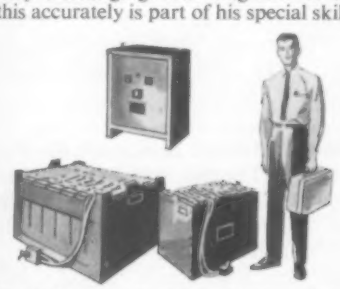
EXIDE POWER PACKAGE

Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa. (ESB)

HOW MUCH EXTRA BATTERY LIFE CAN YOU GET?

You may be getting good battery life now. But the fact is that almost every battery can give better life if certain rather simple conditions are met.

Helping you to get maximum life, and therefore greatest economy, from your batteries is part of the Exide Power Package. The first step is selecting the particular type and capacity battery to fit the job. Your Exide man will recommend a battery capable of providing adequate power without the need for deep discharging. Knowing how to do this accurately is part of his special skill.



The Exide Power Package: Broadest choice of all types of batteries and chargers to meet all requirements, plus factory-quality service for both batteries and chargers.

To meet your particular requirements, he can draw from the broadest line of batteries for industrial truck power, including Exide-Ironclad with tubular positive plate construction; Exide-Powerclad premium pasted plate; and the improved Exide nickel-iron-alkaline (invented by Thomas A. Edison).

Second, it is important that the charger be able to recharge the battery completely within the allotted time, and at the desired rate. If a battery isn't adequately charged, it loses efficiency and its power output is reduced. At the same time, you must guard against overcharging too. Play safe. Ask your Exide man to recommend the right size and type Exide charger when you buy your Exide battery.

Third, make sure your batteries receive good upkeep. This involves more than just routine cleaning and watering. It means periodic inspection and checking by battery maintenance engineers. Exide offers this service at a reasonable fee. Exide service men will help you set up good battery maintenance schedules. They will diagnose problems which might develop—show you whether the cause is in the truck, the charger, the application, or the maintenance. And they will take care of any repairs or adjustments to batteries or chargers which might be called for. You get complete battery and charger service from one source, fast, thorough, dependable.

The combined effects of these three basic parts of the Exide Power Package mean not only longer battery life, but greater battery economy year after year. Find out exactly how you can benefit. Write Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

Simplified electricity bulletin. Do you want to know how storage batteries work and what goes on as they charge and discharge? Send for this detailed bulletin. It's yours free. Also contains tips on how to keep batteries in top operating condition.

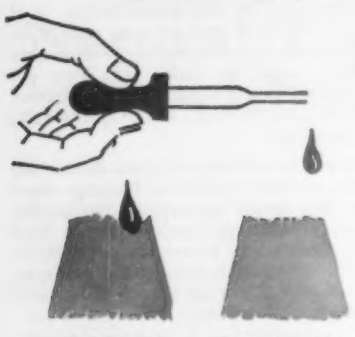
Exide®

For more facts Circle 556 on Reader Service Card

2 DROPS PROVE OUR POINT!

IODINE TESTS SHOW IMPERMEABILITY OF

VALDURA 90 ALUMINUM PAINT



ORDINARY ALUMINUM PAINT

VALDURA 90 ALUMINUM PAINT

When iodine is put on a film of ordinary aluminum paint, the iodine penetrates through the film — proving that the film is porous and that moisture can pass through it to the surface beneath. But when iodine is put on Valdura Aluminum Paint there is a lack of penetration — which means there is less chance of moisture penetrating through the Valdura Aluminum to any metal surface beneath *resulting in rust and corrosion.* To try this convincing test yourself — send for FREE Test Chart today.

VALDURA PAINTS THAT ENDURE

FREE

Send us comparison Test Chart with paintouts for making iodine test.

VALDURA Heavy-Duty PAINT DIVISION
AMERICAN-MARIETTA CO., CHICAGO 11, ILLINOIS

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For more facts Circle 557 on Reader Service Card

FACTORY FILMS

The Quiet Revolution explores the impact of automation on our society and economy—its effect on jobs, legislation, leisure time, education. It points out that while automation is beneficial in some phases of our economy, it is also responsible for many serious problems. The biggest right now is how to find a larger market for increased production of goods. The film offers no conclusion, but stresses the need for responsible action. "Little real work has been done"—industry, labor, and government have done more in shifting responsibility than they have in accepting it. It shows some of the technical strides made by automation but emphasizes the need for factual information and for widespread studies on the nature of this technology. 16mm, b&w, sound, 28 min. Write to:

John J. Carley, Profit Counselors, Inc., 355 Lexington Ave., New York.

Establishing Work Standards by Sampling reviews the principles, and demonstrates the use of the work sampling measurement technique. Shows how a work standard is established for shipping department operations. 16mm, sound, color, 25 min. Write to:

Department of Visual Communication, University of California, Los Angeles 23.

Instructions or Obstructions deals with problems of supervision. Humorous examples illustrate "seven steps in the order-giving process." It shows how supervisors can get cooperation from employees in carrying out orders. Includes leader's guide for use in conducting a one-hour training meeting. 16mm, color, sound. Write to:

The Bureau of National Affairs, Inc., 1231 24th St., N. W., Washington 7, D. C.

Mass-Production Insurance: the Dependable Die Set is a filmstrip that depicts the function of die sets in our mass production economy. It covers quality control, production, and inspection. 35mm, sound, b&w, 15 min. Write to:

Producto Machine Co., 990 Housatonic Ave., Bridgeport 1, Conn.

Problem: Paint jobs ruined by airborne dirt in spray booth

This plant needs make-up air! If the exhaust fans in your paint shop remove air faster than you replace it, they cause a vacuum. The vacuum sucks in dirt and dust every time a door or window is opened. Your plant needs make-up air...a supply of new air to replace exhausted air and cancel out vacuum.

Without make-up air, you get a chain reaction of vacuum problems. Violent cross drafts...Infiltration of dirty air or fumes from outside, and from one plant section to another ...Heat loss...Unhealthy workers... Low morale...Costly absenteeism.

Solution: install separate fans to supply make-up air. They cancel out the vacuum, give your plant balanced ventilation. These fans should be part of a complete make-up air system that tempers and cleans the incoming air.

For technical help on make-up air, see your Consulting Engineer. Or call in Sturtevant application engineers. They're experts in handling air...whether you want to move it, heat, cool or clean it. Mail coupon for booklet on make-up air. J-80709

WESTINGHOUSE ELECTRIC CORPORATION
Sturtevant Division, Dept. 0C09.
Hyde Park 36, Mass.

Send me your make-up air booklet.

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TITLE_____

COMPANY_____

ADDRESS_____

PHONE_____

You can be sure...if it's **Westinghouse**

For more facts Circle 558 on Reader Service Card

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

PLANT SERVICES

275—Water coolers. Catalog lists complete line including wall-mounted off-the-floor types. Halsey W. Taylor Co.

276—Dust collectors. Literature describes features of new automatic dust collector. Torit Mfg. Co.

277—Goggle cleaning station. 3-day free trial offer. Holds 1400 tissues, 16-oz. bottle of cleaner. The Wilkins Co.

278—Air handling. Bulletin 552 covers dual-purpose air supply and exhaust. Applications unlimited. Clarage Fan Co.

279—Steel equipment. Catalog 100 (100 pages) illustrates most diversified line. Lyon Metal Products, Inc.

280—Plant security. Descriptive booklet lists range of electric protection services. American District Telegraph Co.

281—Gas absorbers. Bulletin AP-225 covers air and liquid handling equipment for air cleaning. Buffalo Forge Co.

282—Centrifugal fans. Bulletin 201 on supplying ventilation and process air in large volume. Buffalo Forge Co.

283—Fume fans. Bulletin FI-511 with chemical resistance table, physical properties, etc. Buffalo Forge Co.

284—Liquid chiller. Bulletin 3926 gives details featuring new indicator system control. American-Standard.

285—Dust control. Bulletin 270-A1—"The Answers to the Five Basic Dust Problems." American Air Filter Co.

286—Air conditioners. Cost formula and data on self-contained packaged units, to 75 tons. Typhoon Air Conditioning Div.

287—Dust control. Bulletins contain valuable information about dust control equipment and systems. The Day Co.

288—Activated charcoal. Bulletin T-359. Acts as molecular sponge, purifies air, gasses, liquids. Barneby-Cheney.

289—Damper operator. Bulletin D-251 on piston-type operator control for air circulation control. Johnson Service Co.

290—Motivation kits. Employee motivation kit includes 50-page guide for planning program. Elliott Service Co.

291—Protective cream. Here's information on hand cream for protection against acids. Ayerst Laboratories.

292—2-Way radio. Write for information on fully transistorized pocket 2-way radio. Globe Electronics.

293—Flexible connectors. You'll want IPB-Sec. 7A(a), price bulletin and catalog ID-100E. Universal Metal Hose Co.

294—2-Way radio. Full details on all-transistor model and duo-com 100, or 100S model. Osborne Electronics Corp.

MECHANICAL

295—Screw conveyor drives. Bulletin 7106 on drives ½ to 40 hp. Up to 44,000 lb-in. torque. The Falk Corp.

296—Screw conveyor drives. Bulletin 7106.1—15:1 and 25:1 ratios. Hp. to 125. 100,000 lb-in. torque. The Falk Corp.

297—Shaft, flange drives. Bulletin 7100.1—15:1 and 25:1 ratios. Hp. to 125. 100,000 lb-in. torque. The Falk Corp.

298—Shaft, flange drives. Bulletin 7100—½ to 125 hp. Up to 100,000 lb-in. torque. The Falk Corp.

299—Speed reducers. Catalog 2747 on gearmotor, motogear types in double, triple, quadruple reductions. Link-Belt Co.

300—Speed reducer. Catalog 2751 on In-Line type in double, triple, quadruple reductions. Link-Belt Co.

MATERIAL HANDLING

301—Hoists. Catalog lists complete line electric chain, wire rope, hand hoist, and pullers. Chisholm-Moore Hoist Div.

302—Lifts. Complete catalog describes all 54 standard models power, manually propelled lifts. Crown Controls Co.

303—Slings. Tuffy Tips and sling handbook give helpful data on selection and use. Union Wire Rope, Armco Steel Corp.

304—Scales. Capacities, platform sizes all-steel custom-built scales booklet on request. Cardinal Scale Mfg. Co.

305—Self-dumping hoppers. Literature tells how to cut handling costs by 50%. In eight sizes. Roura Iron Works, Inc.

306—Mobile bins. Full details on round, square types—27-, 30-, 38-, and 50-gal. capacities. Wear-Ever Aluminum, Inc.

307—Hopper boxes. Information on standard hopper end boxes for racking, stacking, packing. Republic Steel Corp.

308—Clip-shelving. Detailed information on complete line—shelves, parts, accessories. Republic Steel Corp.

309—Metal lumber. Attractive brochure on engineered slotted angle. 2 gauges, 2 widths. Republic Steel Corp.

310—Drum racks. Demountable types for 55-gal. drums. Six-piece bolted construction. Republic Steel Corp.

311—Storage racks. Full information on new adjustable, sway-braced racks. Adjusts on 3-in. centers. Palmer-Shile.

312—Wire rope. Free booklet describes structural features, applications. Wire Rope Div., John A. Roebling's Sons.

313—Cord strapping. Information on applications, sizes, tools, and accessories, service. American Viscose Corp.

314—Hoists. Bulletin on line job-mated hoists—capacities ¼ to 30 tons. Shepard Niles Crane and Hoist Corp.

315—Tractor-shovels. Bulletin "Industrial Material Handling from A to Z"—for the asking. Frank G. Hough Co.

316—Steel shelving. Fact-packed catalog on rapidly assembled shelving. No bolts needed. Borroughs Mfg. Co.

317—Gravity conveyors. "Handbook of Materials Handling Ideas" for warehousing problems. Rapids-Standard Co.

318—Monorails. Book, "Cost-Cutting With Monorail and Cranes," (52 pages). Many applications. Louden Machinery Co.

319—Levelling lifts. Catalog RE-203 on oil-hydraulic powered lifts. Capacities 6,000, 12,000 lbs. Rotary Lift Co.

320—Vertical conveyors. Brochure tells how system can solve vertical handling problems. Standard Conveyor Co.

321—Cranes. Catalog lists new series "D" models. 3- to 25-ton capacities. Shaw-Box Crane & Hoist Div., MM&M.

322—Hand hoists. Bulletins DH-164, DH-345 give full information on aluminum and steel types. Wright Hoist Div.

323—Pan, pallet conveyors. Catalog CD-B on conveyors; operate at floor, table, ceiling levels. American Monorail Co.

324—Trambeam systems. Bulletin M-34 illustrates trambeam overhead material handling systems. Whiting Corp.

Turn the page

You'll find just what you want among these

FINE PLIERS by CRESCENT

Crescent makes one of the most complete lines of pliers made anywhere in the world. Under the trade names CRESCENT and CRESTOLOY you will find not only a variety of patterns and sizes, but a perfection of design and a quality of workmanship very difficult to find elsewhere.

Whether you buy for resale, buy for your employees, or buy for your own personal use... you are SAFE if you insist on CRESCENT or CRESTOLOY.

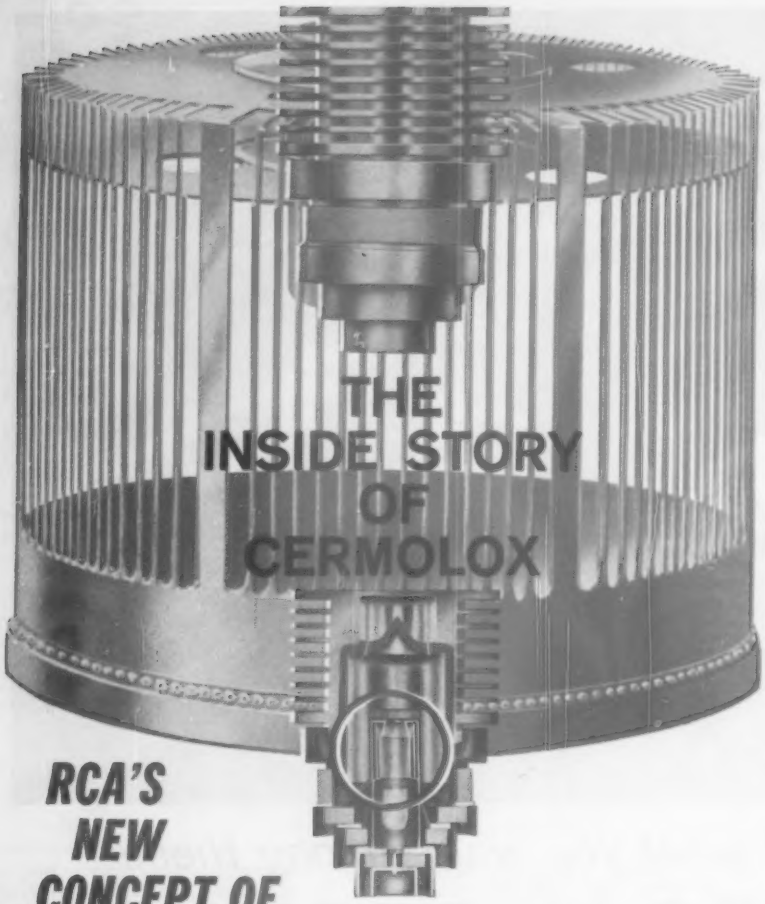
Sold by hardware dealers and industrial distributors everywhere.

- **Miniature pliers**
- **Slip joint pliers**
- **Utility pliers**
- **Long reach pliers**
- **Color keyed pliers**
- **Fence tools**
- **and standard type lap-joint pliers in all popular patterns**

Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

For more facts Circle 559 on Reader Service Card



RCA'S NEW CONCEPT OF UHF BEAM POWER TUBE TECHNOLOGY

This unique beam power tube grid, made by a special process in which two coaxial metal thimbles are simultaneously broached by electrical discharge, provides a new range of capability for your critical UHF applications.

Perfect Grid Alignment...Simultaneous electrical broaching assures perfectly aligned grid wires for maximum electrical efficiency, high power output, minimum screen current.

Exceptional Strength and Rigidity...One-piece grid structures eliminate most internal stresses of welded assemblies and have far greater strength and rigidity.

Special RCA Ceramic-Metal Construction...Cermolox tubes embody exclusive RCA advances in ceramic-metal bonding; bond is as strong as the ceramic itself! Means superior insulation, low rf loss, compact size, unexcelled high temperature operation.

NET RESULT: A compact, sturdy, high-power UHF tube ideally suited for CW or pulse operation in a resonant cavity or a parallel-line circuit. See your Authorized RCA Industrial Tube Distributor for full information. RCA Electron Tube Division, Harrison, N. J.

TYPES FOR CW APPLICATIONS—CLASS C SERVICE

RCA Type	Cooling Method*	Filament or Heater Volt/Amperes	Maximum DC Input Watts	Typical Operation: Frequency MC	Typical Operation: Approx. Power Output Watts
A-2545-A	FA	8/88	28,000	400	10,000
A-2582-A	C	12.6/5	52.5	3,000	32
A-2678	C	6.3/1.0	52.5	3,000	32
6816	FA	6.3/2.1	180	1,215	40
6884	FA	26.5/0.52	180	1,215	40
7213	FA	5.5/17.5	2,500	600	1,350
7457 Ruggedized	FA	6.3/3	180	1,215	40
7650 Ruggedized	FA	6.3/7.5	1,000	1,215	450
7842 Ruggedized	C	6.3/3	180	1,215	40
7843	C	26.5/0.52	180	1,215	40
7844	C	6.3/2.1	180	1,215	40

*FA = Forced Air; C = Conduction
Prefix "A" designates developmental type

TYPES FOR PULSE APPLICATIONS

RCA Type	Filament or Heater Volts/Amperes	Pulse Duration (μs) / Interval (μs)	Typical Operation: Frequency MC	Typical Operation: Duty Factor	Typical Operation: Approx. Useful Power Output at Peak of Pulse KW
7214	5.5/17.5	$\frac{10}{1000}$	1,215	0.01	88
7649 Ruggedized	6.3/3	$\frac{10}{1000}$	1,215	0.01	40
7651 Ruggedized	6.3/7.5	$\frac{10}{1000}$	1,215	0.01	39
A-2581-A	22/12	$\frac{10}{1000}$	500	0.005	500

The Most Trusted Name in Electronics
RADIO CORPORATION OF AMERICA

ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

325—Batteries. Write for booklet, "Why We Use Battery-Electric Industrial Trucks." Gould-National Batteries, Inc.

326—Truck scales. Bulletin 2417 gives full details on electronic truck scale line. Scale Div., Toledo Scale Corp.

327—Steel shelving. Reference manual No. 485 and booklet "How To Solve Your Storage Problems." Equipto Div. Aurora.

328—Strapping tape. Free test sample for fast, easy way to bundle for shipping and handling. Arno Adhesive Tapes.

329—Floor trucks. Junior catalog 59G lists varied line to handle any material problem. Nutting Truck & Caster Co.

330—Storage racks. Catalog 107-CF gives facts, capacities, weights, dimensions. Bernard Gloekler North East Co.

331—Stapler. Complete story on new S-763 nailer. Drives 1½- to 2-in. staples. Fastener Corp.

PLANT SITES

332—Kentucky. Brochure (52 pages) gives full facts for location of industrial plants. Commonwealth of Kentucky.

333—Louisiana. Write for new booklet, "Louisiana Invests in Industry," for facts. Louisiana Dept. of Commerce.

334—Greenville, Pa. Write for location factors of 750-acre plant site near city. Bessemer & Lake Erie Railroad Co.

335—West Virginia. Here are facts on locations for plants. West Virginia Industrial & Publicity Commission.

336—Nebraska. Data on manufacturers' production capacities in Northern Plains States. Northern Natural Gas Co.

BUILDING

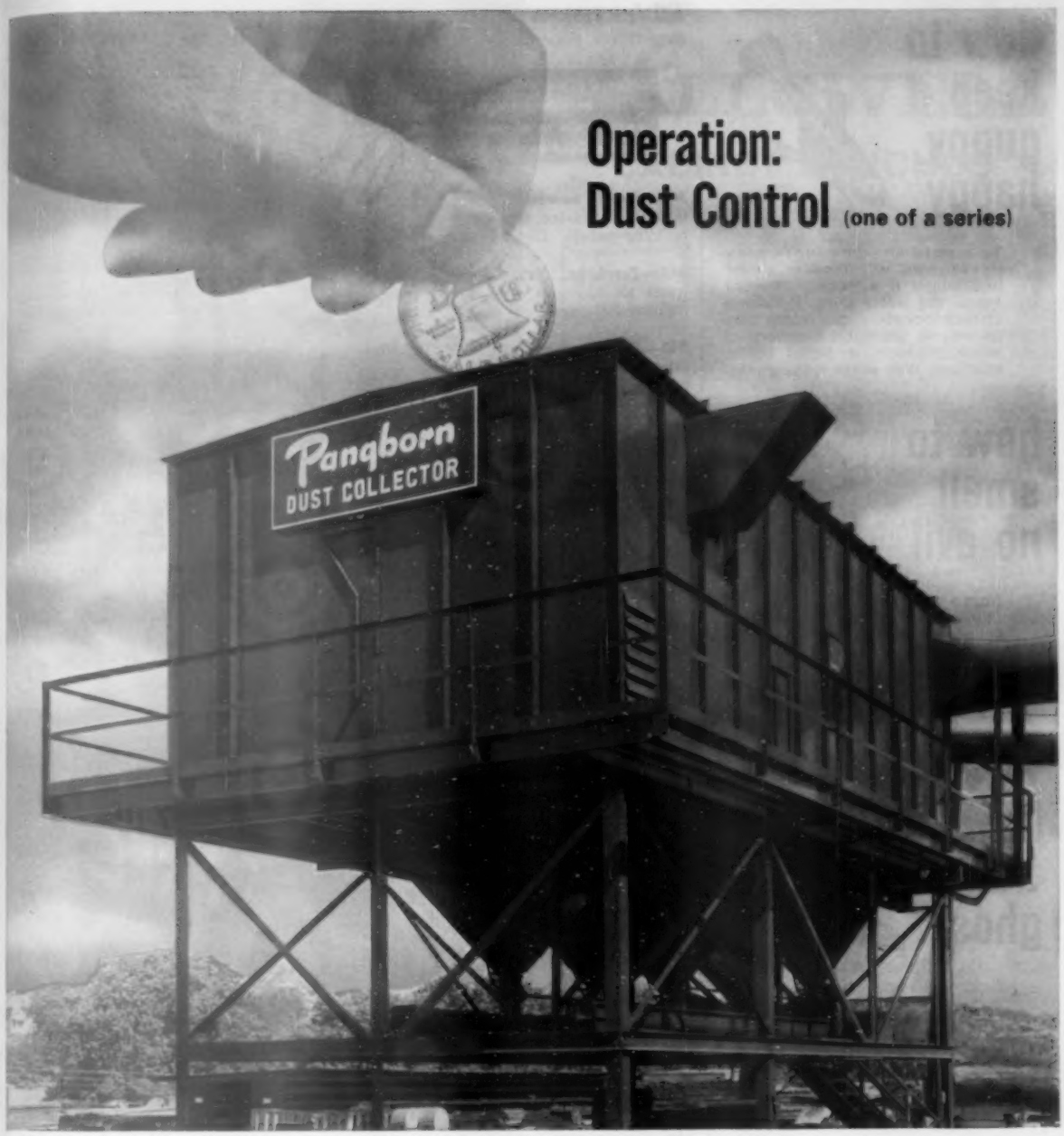
337—Plastic panels. Full details on guaranteed non-pitting, non-eroding, non-fading plastic panels. Butler Mfg. Co.

338—Grating. New, complete catalog describes safety features of fireproof Grip Strut grating. The Globe Co.

339—Plastic panels. Kit has information, technical and test data on Filoplated panels. Filon Plastics Corp.

340—Grating. Write for fact file on high-strength, rattle-proof aluminum floor grating. Kerrigan Iron Works Co.

Turn the page



EVER SEE A BANK LIKE THIS?

Salvaged dust can mean money in the bank. And Pangborn Dust Control equipment works quickly and efficiently to reclaim valuable dust for you.

Yet salvage opportunities are only a part of the savings offered you by Pangborn Dust Control equipment. It also eliminates health hazards in your plant and makes for better housekeeping; it removes abrasive or corrosive dusts that can endanger machinery; and it increases the efficiency of your employees and improves community relations.

Pangborn has the right Dust Control equipment for all your needs: Dry Collectors in Cloth Bag, Tube, Screen, Self-Cleaning, Unit Types and Wet Collectors in all sizes. For all the facts write:

Pangborn Corporation, 2100 Pangborn Blvd., Hagerstown, Md.; Pangborn Canada Ltd., 41 Mattson Rd., Toronto, Ontario, Canada:—Manufacturers of Dust Control, Blast Cleaning and Vibratory Finishing Equipment ... ROTOBLAST® Steel Shot and Grit®

Pangborn
OF HAGERSTOWN

how to keep a guppy happy

Your pet fish—or your friends downstream will breathe easier and longer if activated charcoal keeps the water pure. Reducing stream pollution can often pay its way in profitable recovery of waste products, in better public relations. Well worth looking into.

how to smell no evil

Some people wear gas masks (containing activated charcoal). Others breathe air freshened with activated charcoal air purifiers. They (the people) work better, more safely. You save money by recirculating warmed or cooled air instead of blowing it away. Suggest you ask your plant or consulting engineers about it.

how to trap a ghost

Before solvent vapors fly out the window, many smart users literally wring them out of the air into liquid form, good as new, at costs as low as 2c a gallon—with activated charcoal recovery systems. Bonus: you may also raise worker efficiency with the right atmosphere, reduce heating costs.

activated charcoal

Activated charcoal acts as a molecular sponge, purifies air, gases, liquids — recovers solvents — removes odors and impurities. Write for Bulletin T-359. Barnebey-Cheney, Columbus 19, Ohio.

Barnebey Cheney

ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

341—Plastic panels. Complete information on corrugated, flat reinforced plastic building panels. Dipcraft Mfg. Co.

342—Trackage. Track kit FA-3 illustrates all elements needed for efficient industrial siding. L. B. Foster Co.

343—Roofs. Here are specifications, other details on smooth surface asbestos built-up roofs. Johns-Manville.

ELECTRICAL

344—Silicone insulation. Brochure, "Specify Silicone Insulation and Save," gives facts. Dow Corning Corp.

345—Pushbuttons. Bulletin B-82 lists full data on new all-rubber Flexitite pushbutton station. Joy Mfg. Co.

346—Graphic recorders. Here's a folder on new Analog-Event recorder—does work of two. Esterline Angus Instrument Co.

347—Fuses. New booklet, "Basic Protection For Electrical Power Systems," for proper selection. Bussmann Mfg. Div.

348—Control stations. Publication 6090 lists complete line of pilot control units and stations. Allen-Bradley Co.

349—Motor starters. Publication 6088 illustrates line of reduced motor starting units. Allen-Bradley Co.

MAINTENANCE

350—Paint. Comparative test chart with paintouts for making iodine impermeability test. American-Marietta Co.

351—Scrubber-Vac. Literature on combination floor machine and cleanser for greasy floors. Finnell System, Inc.

352—Smokecandle. Technical data, sizes and prices on smoke generators for detecting leaks. Superior Signal Co.

353—Paint. "Slide guide" contains complete data on selection of proper paints. Barreled Sunlight Paint Co.

354—Telescopic platform. This catalog lists full line custom-built Hi-Reach Telescopers. Economy Engineering.

355—Floor surfacer. Want complete information on Latex, a resilient cement-latex mixture? Pennsalt Chemicals Corp.

356—Roofing material. Here are details on amazing roof materials, and how you will save. Tropical Paint Co.

Turn the page

NOW! IMPROVE PRODUCTION — LOWER MAINTENANCE COSTS

with

K-LENS-M

BETTER VISION PRODUCTS

The Modern Liquid Method that Cleans Glass or Plastic at Lower Cost per Cleaning.

The K-Lens-M Goggle Cleaning Station cuts down maintenance time for refilling; holds 1400 K-Lens-M lens tissues; dispensing one sheet at a time; holds full 16 oz. bottle of K-Lens-M lens cleaner.

Request 30-day FREE Trial Offer

The WILKINS Co., Inc.
Cortland 41, N. Y

Wise to Choose — Safe to Use

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See K-LENS-M Booth 78 at the Greater New York Safety Convention & Exposition

Circle 563 on Reader Service Card

FREE

EMPLOYEE MOTIVATION KIT

Includes:

- SUCCESSFUL SUPERVISION
  MOTIVATION
  LINE-STAFF RELATIONS
  CASE STUDIES
- MULTI-COLOR DISPLAYS
  QUALITY WORK
  WASTE REDUCTION
  INJURY PREVENTION
- 50 PAGE PLANNING GUIDE

This valuable kit is yours without obligation. Simply fill out the coupon and mail it today.

ELLIOTT SERVICE COMPANY, INC.
Mount Vernon, New York

ELLIOTT SERVICE COMPANY, INC.
Dept. F-1, Mount Vernon, N. Y.

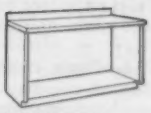
Please provide me with the Elliott "Employee Motivation Kit."

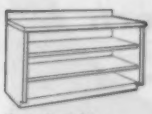
Name .....
Title .....
Firm .....
Address .....
City ..... Zone ..... State .....

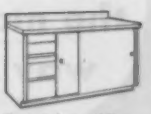
Circle 564 on Reader Service Card

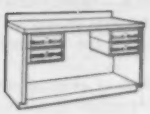
HALLOWELL

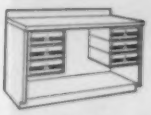
CABINET BENCHES

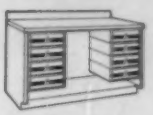

Model 608-Basic Bench

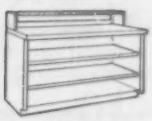

Two adjustable shelves


Two shelves, sliding doors and lock

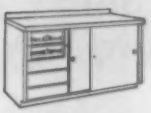

Two 2-drawer tiers


Two 3-drawer tiers


Two 4-drawer tiers


Two shelves and top shelf

Drawer tiers and storage wall


Two shelves, sliding doors and drawer tier

Electrical panel, shelves and sliding doors

Three 2-drawer tier units

Top shelf, shelves and sliding doors

There is a standard HALLOWELL Cabinet Bench for every job. Drawers, doors, electrical panels or test panels, shelves and other interchangeable accessories give you what you need *now*—yet enable you to rearrange or add as work requirements change. Built to last indefinitely. Ask your HALLOWELL distributor for full information, or mail coupon below.

COLUMBIA-HALLOWELL Division SPS
Jenkintown 11, Pa.

Please send me the full line Hallowell Shop Equipment Catalog.

NAME_____
Please Print

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

COLUMBIA-HALLOWELL Division **SPS** JENKINTOWN 11, PA. • SANTA ANA, CALIFORNIA

where reliability replaces probability

For more facts Circle 565 on Reader Service Card

with new

Aerovent

FIBER GLASS DUCT FANS

Featuring a unique built-in orifice and tear-drop shaped belt housing, Aerovent *Fiber Glass* Duct Fans are designed for your "*problem*" ventilating requirements. Virtually unaffected by normal concentrations of corrosion and most forms of chemical attack, *fiber glass* – used in the construction of the fan housing and other internal surfaces – assures longer, more dependable service in even the most difficult applications.

Propellers are stainless steel or Dura–a special alloy created by Aerovent for better resistance to corrosive atmospheres. Available in 17 models in sizes 14" to 42" for capacities to 32,500 cfm.

write for bulletin 175

All deliveries of all Aerovent equipment are tested and rated in accordance with established and accepted codes and each unit is guaranteed by the manufacturer to deliver its rated performance. CERTIFIED PERFORMANCE

Aerovent *Aerovent*

FAN COMPANY, INC.

Ash and Burd Streets Piqua, Ohio

ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

357—Couplings. Catalog No. 58 gives facts on valved couplings. Includes sizes, and metal finishes. Snap-tite Inc.

358—Drain cleaner. Complete information on one-man powered drain cleaning machine. Kollmann Mfg. Co.

359—Maintenance truck. Write for job data on maker's F-10 motorized platform truck for various uses. Prime Mover Co.

360—Leveling machinery mounts. Need information on how to control vibration of machines? Clark, Cutler, McDermott Co.

361—Engineered maintenance. Booklet (16 pages) fully describes organized maintenance program. Puritan Chemical Co.

362—Vacuum cleaner. New bulletin on model 140 for wet or dry pickup. Two-speed units. Clements Mfg. Co.

363—Power sweeper. Here are performance data, photos, on all-new floor sweeper model "85". G. H. Tennant Co.

364—Paint. Illustrated catalog on color-horizons system. Includes applications, color charts. Rust-Oleum Corp.

PRODUCTION

365—Visible rceords. Booklet tells about production planning and control panels. Acme Visible Records, Inc.

366—Metal lathes. Catalog lists complete line accurate, versatile, low-cost machines. Rockwell Mfg. Co.

367—Recorders. Illustrated folder gives data on time recorders for production control. Service Recorder Co.

368—Visible records. Here are case histories and other data on systems for record-keeping. VISIrecord, Inc.

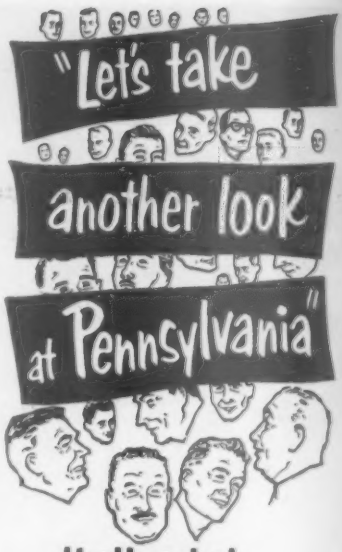
369—Heat exchangers. Bulletin P60 contains details on structural features and applications. Tranter Mfg. Inc.

370—Vibratory feeders. Descriptive bulletin on full line—from ounces to many tons per hour. Eriez Mfg. Co.

371—Magnets. Bulletin gives facts on permanent grate magnets to solve problems of contamination. Eriez Mfg. Co.

372—Thread tapper. Booklet 93-31 gives complete data on air-powered, positive-feed tool. Gardner-Denver Co.

Turn the page



. . . that's what hundreds of industrial executives are saying and doing!

In the past five years they announced:

504 NEW PLANTS
600 RE-OPENINGS OF IDLE PLANTS
1009 PLANT EXPANSIONS

(Send for the list—address below)

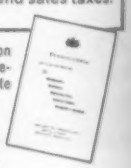
They are finding:

Surplus of industry-minded workers . . . Strategic locations in the great Eastern market with access to major trunk line railroads, and modern highway and Turnpike networks . . . Ports on the Atlantic, St. Lawrence Seaway and Ohio River system . . . All types of industrial raw materials and components . . . 100% low-interest plant financing in labor surplus areas . . . Choice of industrial "parks" and individual plant sites.

An excellent "tax climate"

No state personal income tax—no machinery or inventory taxes—no graduated state tax rates—no direct state property tax—manufacturing activities in Pennsylvania are exempted from capital stock, franchise, and sales taxes.

For free copy of "Plant Location Services" pamphlet, or for details on 100% financing, write or call:



Pennsylvania Department of Commerce

South Office Building
1085 State Street, Harrisburg, Pa.
Phone: CEdar 4-2912

SAVE MONEY!

TRANSLUCENT

FIBERGLASS

REINFORCED PLASTIC

BUILDING PANELS

As Low As 30c Sq. Ft.

ALL COLORS
ALL CORRUGATIONS or FLAT
ALL SIZES
from individual glazing panes to factory wall size panels...

Get the Dipcraft Story . . . Write or call today!

DIPCRAFT MFG. CO., 4830 Hatfield, Pgh. 1, Pa.
MUseum 3-3400

For more facts Circle 569 on Reader Service Card

The 42 LB.
GRIPHOIST
TIRFOR

LIFTS • PULLS
LOWERS
3300 LBS.
Single Line

Capacity increased to 6 TONS with pulley blocks

•

Replaces chain hoists, air hoists, winches . . less cost, less maintenance. Unlimited cable travel, portable, hand operated . . faster, cuts rigging time . . unmatched safety record.

One Year Guarantee

Preferred on job after job, in construction, refineries, oil drilling, plant erection and maintenance, mining, machinery moving, trucking, etc.

½" wire rope

3,300 LBS.

GRIPHOIST, INC.
744 Harrison St., San Francisco 7, Calif.
334 Granite Ave., Boston (Milton 86), Mass.

For more facts Circle 570 on Reader Service Card

NEW MOBILITY!
NEW EFFICIENCY!

ASK FOR NEW BULLETIN

Two speed power unit easily demounts for use as hand or shoulder carried blower-suction cleaner.

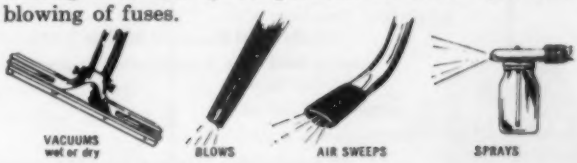
CLEMENTS
Cadillac® MODEL 140
QUIK-VAC®
FOR WET OR DRY PICKUP

NEW
LARGE WHEELS
Go up and down stairs, over rough walks. Roll the Model 140 wherever the job is.

NEW
HANDY ATTACHMENT CARRIER
Plenty of room for all attachments. Securely fastened, but easily removed.

NEW
EASY GRIP HANDLE
Strong and sturdy. Encircles the canister base for greatest rigidity.

Two-speed power unit—provides the utility of two cleaners for the price of one. **Two hose sizes**—1½" hose and attachments for average cleaning . . . 2" for maximum air volume. **Simplest hookup**—either 1½" or 2" hose can be attached to dirt container, to power unit inlet or power unit outlet without the necessity of additional couplings and hose. **Low current demand starting from low-speed** position on switch prevents blowing of fuses.



VACUUMS wet or dry | BLOWS | AIR SWEEPS | SPRAYS

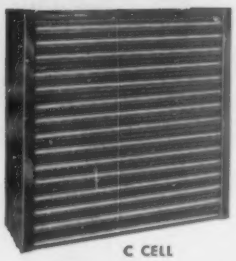
SINCE 1910

Industrial Products Division
CLEMENTS MFG. CO.
6614 South Narragansett Ave.
Chicago 38, Illinois

For more facts Circle 571 on Reader Service Card

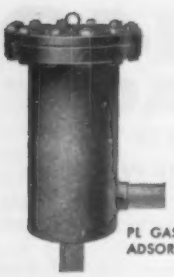
Problems of Air Purification and Odor Control

This is DOREX ... it SOLVES all these



C CELL

H CANISTER



PL GAS ADSORBER

AIR IMPROVER

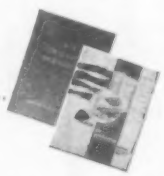
To most of industry's odor abatement, odor control, and air recovery problems, a Dorex product is the most effective, most economical solution.

By completely adsorbing air-entrained odorous, gaseous, and vaporous impurities, Dorex solves the serious air pollution problems plaguing industry, business, and the general public: purification of severely contaminated intake air; purification of recirculated air; purification of contaminated exhaust air. Thirty years of research, development, and application guarantee it. Write for literature that describes how Dorex products illustrated at the left function in each application below. If yours is a problem not mentioned, describe it to us and we'll provide specific recommendations.

- Purifies intake air before it is admitted to areas that must remain free of foreign odors (food and drink processing, testing, etc.).
- Purges exhaust air of contaminants before it is emitted to outside (animal research labs, etc.).
- Purges compressed air intake of oil vapors and gases.
- Eliminates offensive food odors of cafeterias, other dining areas.
- Eliminates offensive odors of locker and rest rooms.
- Greatly reduces amount of outside air required by air conditioning system.
- Permits recirculation of fume-free air in confined areas (crane cabs of steel plants, e.g.).
- Protects delicate equipment, nearby office personnel from injurious effects of highly corrosive chlorine, sulphur gases (e.g., paper mills, etc.).
- Accomplishes emergency removal of toxic gases (nuclear conditions, etc.).
- Purifies outside air, possibly contaminated by neighboring industry, before it is taken into the air conditioning system.

CONNOR... for Constant Comfort Conditions

Request copies of Bulletin 108A and "Air Conservation Engineering"



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dorex®

CONNOR ENGINEERING CORPORATION

DANBURY • CONNECTICUT

... the most experienced professionals in air recovery and purification.

ADVERTISERS' LITERATURE

Begins on page 252

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

373—Marking devices. Want information on offset bar and tube printer machine? Pannier Master Markers.

374—Painting machines. Brochure gives features of painting machine for product finishing. Conforming Matrix Corp.

375—Data processing. Case histories show application of system for plant control problems. Royal McBee Corp.

376—Masking adhesives. Write for details on product-finish protective masking tapes. Mystik Adhesive Products.

377—Vacuum recoverer. Here's a folder on equipment for welding flux recovery. Invincible Vacuum Cleaner Mfg. Co.

378—Electronic controls. New catalog describes wide selection of heavy duty industrial equipment. Autotron, Inc.

379—Schedule board. This guide to control methods has full-scale, sample chart section. Conley, Baltzer & Steward.

380—Rivitor. Bulletins 646 and 555 give full facts on Rivitor and Clinchor machines. Tomkins-Johnson.

381—Assembly containers. Brochure describes bench stands for mounting Plastiboxes; other equipment. G. B. Lewis Co.

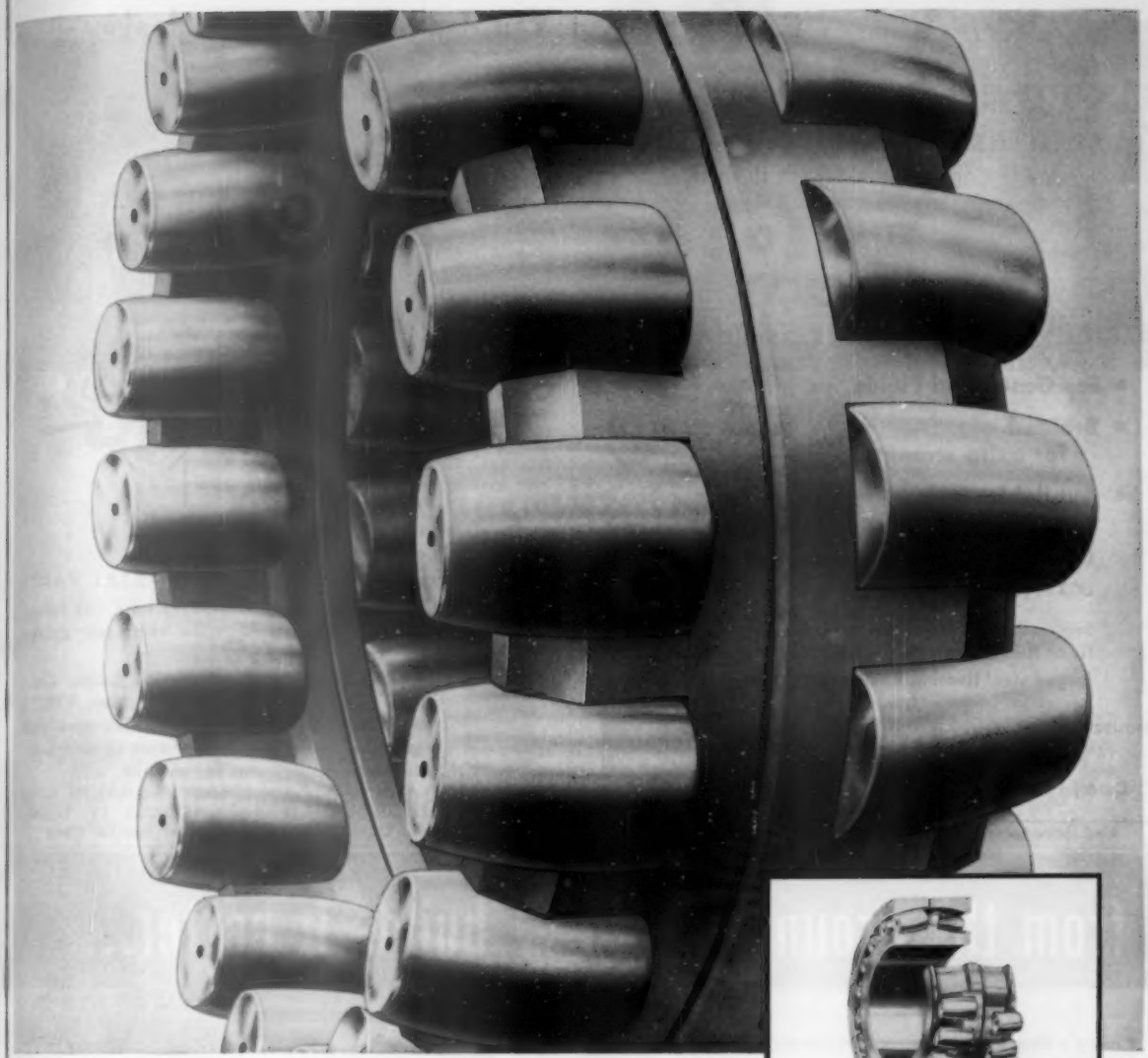
382—Industrial TV. Write for copy of closed-circuit TV system-planning guide. Gives applications. Philco Corp.

383—Schedule boards. Booklet X-300 (24 pages) shows applications of visual control boards. Graphic Systems.

Cost reduction helps

Here are a few of FACTORY's reprinted articles on cost reduction. Order them by number from FACTORY Reader Service, 330 W. 42nd St., New York 36. (35¢ per copy.)

15 18 Ways to Cut Maintenance Costs
101 Organize for Cost Reduction
103 Find and Plug Profit Leaks
150 18 Ways to Pinch Pennies
158 16 Soft Spots in Maintenance Costs
196 How to Use the Profit-and-Loss Statement to Cut Costs
201 A Pro Looks at Maintenance Cost Reduction
218 Big Company V.P. Takes Aim at Costs
249 Better Records Management



Superior design features of TORRINGTON SPHERICAL ROLLER BEARINGS

- integral guide flange for roller stability
- asymmetrical rollers seek flange for positive guidance
- electronically matched rollers
- size-stabilized races
- fully machined land-riding bronze cages
- controlled internal clearances
- even load distribution
- inherent self-alignment
- long service life

"Caged" for Longer Life!

The two land-riding cages in Torrington Spherical Roller Bearings assure proper roller spacing and guidance, even under rugged conditions of shock load and sustained high speeds. These fully machined cast bronze cages operate independently. Their design eliminates drag on rollers. These high-strength cages help bearings give longer life by providing low friction, smooth running and cool operation. Highly effective and generous lubrication of all contact surfaces is achieved with the open-end cage design.

The result: Torrington Spherical Roller Bearings are built to give extra years of unmatched service life in heavy-duty applications. Torrington's long experience in design, engineering and manufacture of every basic type of anti-friction bearing provides the finest spherical roller bearings available. You'll find it pays to standardize on Torrington.

progress through precision **TORRINGTON BEARINGS**

THE TORRINGTON COMPANY South Bend 21, Indiana • Torrington, Conn.

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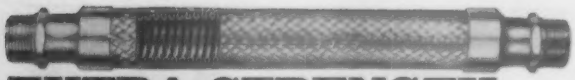

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Misalignment Correction — Strain Reduction

UNIVERSAL UC3
All-Metal Flexible Connectors

- **For Gases and Fluids**
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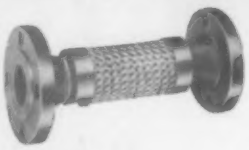
- **Available —**



UC3 BRONZE — for temperatures to 400°F.
UC3 CARBON STEEL — for temperatures to 750°F.
UC3 — 304 ALLOY — for temperatures to 850°F.

Supplied with solid male connectors, forged steel fixed flanges, solid male and union female, or forged steel floating and fixed flanges.

Request IPB-Sec. 7A(a) Price Bulletin and complete Catalog ID-100E

2147 South Kedzie Avenue, Chicago 23, Ill.

For more facts Circle 574 on Reader Service Card

You don't have to be a Monkey—

. . . to loosen frozen bolts on utility poles. The new Aerosol Kroil, which can be squirted with one finger, loosens the most stubborn frozen metal parts . . . FAST. More than 18,000 shops depend on Kroil whenever frozen metal parts threaten to tie up production or waste manhours. In this new package it is the finest rust-busting tool ever . . . shoots a stream 3 ft. yet won't leak. One customer said, "before trying Kroil we broke off every nut (on our heat treat trolleys), since then we have not lost one and have decreased the repairing time from 30 minutes to about 6 minutes per trolley."

KANO KROIL LOOSENS FROZEN METAL PARTS

Use Kroil on all dismantling jobs; for filing, sawing, honing; . . . also keeps air driven tools running freely.

Just try Kroil on a make good basis. Case of 12 Aerosol Kroil 12 ounce cans $18.75 f.o.b. factory or send $2.00 for one can postpaid. If it doesn't perform to suit you, return the empty can for refund.

KANO LABORATORIES 1067 THOMPSON LANE NASHVILLE 11, TENN.

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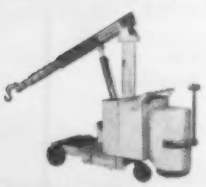
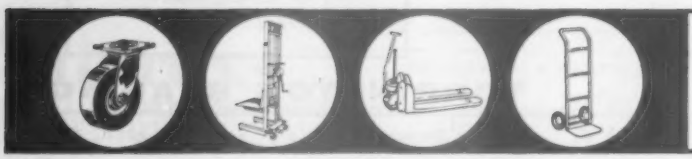
from the ground UP colson builds it better...

Colson's Herculift M-10 Precision Control Mobile Crane loads up to .01 of an inch in *any* direction . . . up to six feet beyond the chassis and nine above the floor. Gives pinpoint accuracy and top speed to repair, maintenance or installation jobs, with precision handling power for equipment up to 5000 lbs. Precision machined lathe type control wheel for side-to-side travel. Heavy Duty Herculift M-10 series now available, capacities to 8000 lbs. and up to 6-foot extension. Send for free literature on the complete Herculift line.



Herculift Standard is the perfect economy-priced mobile crane for use in operations where less precision is required. Moves in four directions, handles up to 5000 lbs. Quickly pays for itself!



THE COLSON CORPORATION
7 South Dearborn Street • Chicago, Illinois
Plants: Jonesboro, Arkansas; Elyria, Ohio; Somerville, Massachusetts; Toronto, Can.

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Wood's specialization provides the right drive to solve your belted transmission problems . . .

. . . particularly if your problems involve horsepower, high, low or variable speeds, drive efficiency, space, economy or availability.

This is because Wood's people are specialists in the production, selection and application of *all* basic types of belted drives.

We are able to provide the *right* drive for a specific application because we manufacture all of the basic types. So, drive problems can be solved by Wood's fast and economically.

To the breadth of Wood's belted power transmission line, add depth of engineering and manufacturing experience (104 years, to be specific). This depth of experience is another element of specialization that enables Wood's to offer not only unique product advantages, but consistently high performance as well.

This is Wood's stock in trade . . . supplying the *right* answers to belted power transmission problems from a broad line of Ultra-V Drives . . . Variable Speed Drives (Motion and Stationary Control) . . . Timing Belt Drives . . . Flat Belt Drives.

Send for your copy of BULLETIN 23103.

Wood's

T. B. WOOD'S SONS COMPANY

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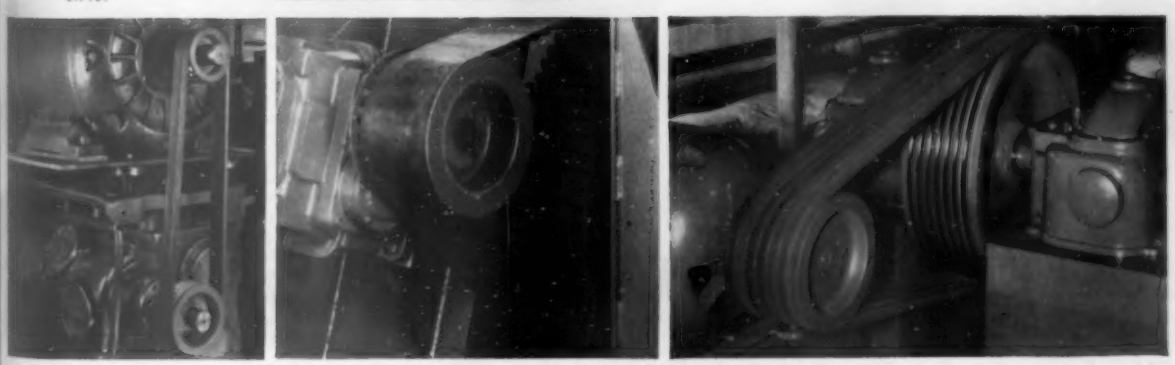

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Choose from 54 models of the "best workers" you will ever have in your shop!

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MODEL B-57

Complete with batteries and built-in charger—1500 lb. capacity—57" lifting ht.—manually propelled—power lift.

$297.

Power Propelled MODEL W-57

Complete with batteries and built-in charger—1500 lb. capacity—57" lifting ht.

$997.

Power Propelled MODEL WT-110

Complete with batteries and built-in charger—1500 lb. capacity—110" lifting ht.

$1497.

FREE—Send for complete catalog and price list describing all 54 standard models.

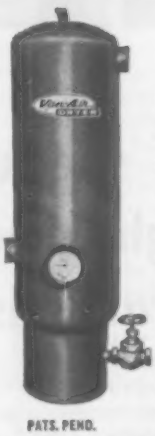
CROWN CONTROLS CO., INC.

TORY AVENUE • NEW BREMEN, OHIO

For more facts Circle 578 on Reader Service Card

COMPRESSED AIR DRYERS

Stop Freezing of Air Lines Inside and Outside Entire Plant — Extract Moisture and Foreign Particles — Protect Pneumatic Equipment against Corrosion and operate for LESS THAN 1-CENT PER 18,000 CU. FT.



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Van-Air® DRYER

VAN-AIR DRYERS require NO regeneration, heat, power, injection or volume loss — operate automatically — deliver air dry, clean, sterile, non-toxic. Built in sizes to treat any volume of compressor output — large or small — NO LIMIT.

PLANT ENGINEERS — Look into the DOLLAR economy and PENNY cost of VAN-conditioned compressed air. Ask for 16-page brochure with charts.

VAN PRODUCTS CO. ★ Engineers ★ Manufacturers

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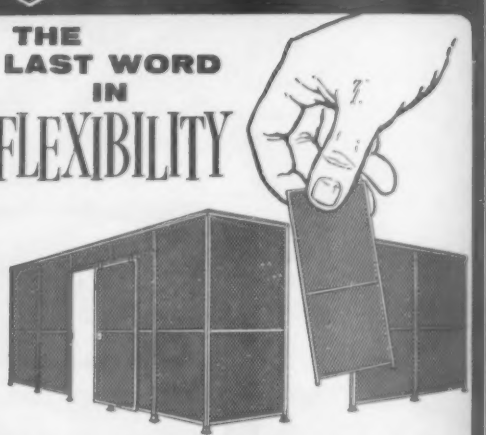
WIPCO WIRE PARTITIONS

THE LAST WORD IN FLEXIBILITY



WIPCO woven-steel wire partitions are designed to fit any area, regardless of height, location of doors and other openings, etc. Easy and economical to erect, your own men can put them up without outside help! Use them over and over again, salvaging each individual section for use in new erections. Available in *standard* sections from stock—or *custom-built* for any requirement, WIPCO partitions are easy to paint and clean—require little or no maintenance! For increased efficiency and flexibility at lower cost, get the facts on WIPCO wire partitions!

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WIRE & IRON PRODUCTS INC.

1738 SIXTEENTH STREET, DETROIT 16, MICHIGAN

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McGRAW-HILL

BOOK NEWS

LEADERSHIP AND ORGANIZATION

A Behavioral Science Approach

Just Out. Presents vital facts on key areas of human relations as applied in modern business and industry. Covers leadership training, decision-making, productivity, morale, bureaucracy, status, and more. Shows how personality, group, organizational, and cultural variables affect each of these areas and outlines practical applications of human relations in formal organizations. **By R. Tannenbaum, I. Weschler, and F. Massarik, UCLA. 429 pp., illus., $7.50**

STAFF IN ORGANIZATION

Just Out. Brings you practical facts that lead to increased efficiency and profitability of the business organization—through greater use of the capabilities of every staff member and more effective integration of staff functions. Explains how military experience in organization can be used in modern business to employ executive manpower most effectively, improve communication, and increase staff-line coordination. To facilitate the work of key management, the book examines the problems of employing "assistants-to" executives. **By E. Dale, Ernest Dale Assoc., and L. F. Urwick, Urwick, Orr & Partners, Ltd. 250 pp., 14 illus., $6.00**

VITALITY IN A BUSINESS ENTERPRISE

Just Out. Practical principles of managing a business successfully for the long run are outlined in this book by the president of American Telephone and Telegraph Company. With penetrating insight, he pinpoints forces of decay that can undermine a currently successful enterprise . . . suggests how to deal with them . . . and shows why management must set goals to stimulate people to strive beyond the level of present abilities. **By Frederick R. Kappel, President, American Telephone and Telegraph Co. 102 pp., $4.00**

MACHINE SHOP ESTIMATING

Here's on-the-job help to make quick, reliable estimates of the time it takes to do the different machining operations in any machine shop—large or small. Describes every operation from drilling and boring to threading and grinding—every step from setting up a job to tearing it down—giving the specific time value for each element of the work. Includes sample estimates for each operation described, tables of variants and constants, etc. **By W. A. Nordhoff, Douglas Aircraft Corp. 2nd Ed. 544 pp., 344 illus., $9.00**

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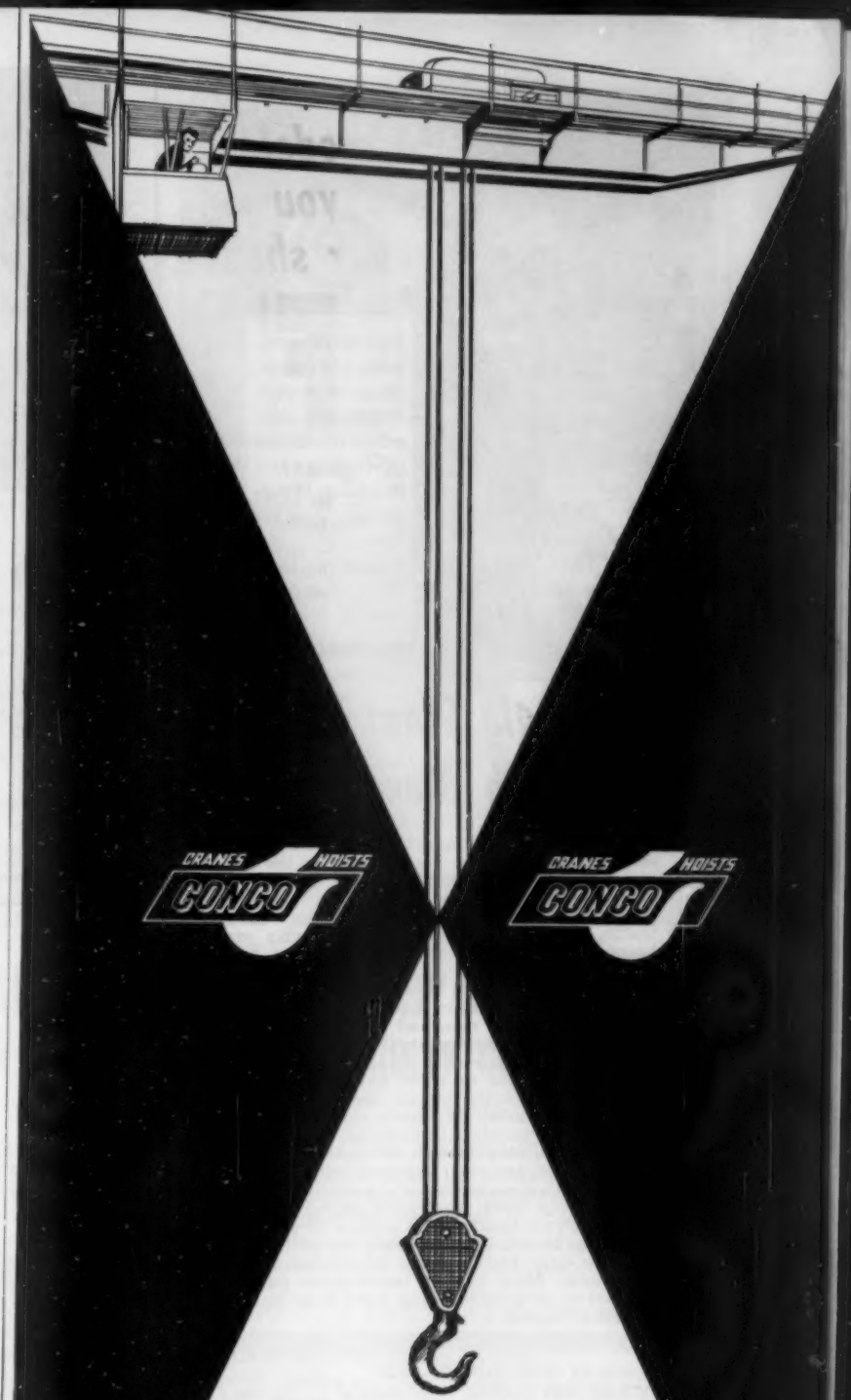

Custom-Engineered Overhead Electric Traveling Cranes in Capacities to 150 Tons. Write for Bulletin 5000B.

Material Handling Division
CONCO ENGINEERING WORKS, INC.
Mendota, Illinois

AFFILIATES: Spartan Tool Division—Powered Sewer Cleaning Equipment • Field Control Division—Barometric Draft Controls • Conco Building Products, Inc.—Brick, Tile, Stone

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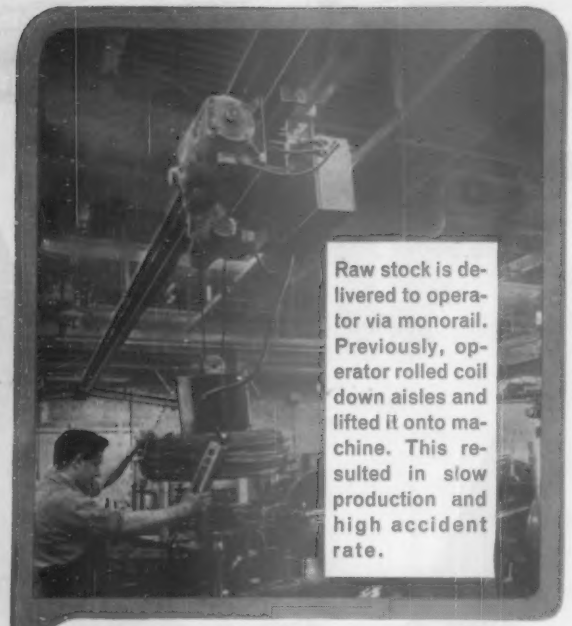

Raw stock is delivered to operator via monorail. Previously, operator rolled coil down aisles and lifted it onto machine. This resulted in slow production and high accident rate.

Untangle Plant Traffic With Monorail

Clear the aisles for production . . . use monorail for materials handling. Suspended from the ceiling, a Louden Monorail Handling System removes traffic from the floor, saves floors for production. Not only does this untangle plant traffic, but also increases plant capacity and becomes a big factor in cutting cost of floor maintenance.

A Louden Monorail Handling System moves raw stock, semi-finished and finished products over the heads of men and machines, and its exceptional flexibility makes it ideal for all types of handling requirements. It can transport materials from point to point anywhere in your plant, either piloted by an operator or completely unattended. Materials can travel from floor to floor, building to building, opening and closing doors, pass through one processing stage after another, and even load and unload its own carriers with certain classes of materials.

When you have material handling requirements, call on Louden, the pioneer of monorail handling. Benefit by Louden's unequalled experience and broad array of service-proven equipment. Most Louden installations pay for themselves in months; some have done so in a matter of weeks.

Write today for "COST-CUTTING WITH MONORAIL AND CRANES" . . . pages of illustrated applications, industry by industry.

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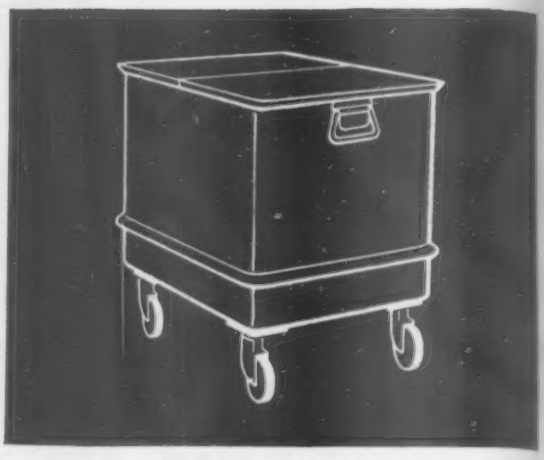
MONORAIL & CRANES

THE LOUDEN MACHINERY COMPANY
315 Broadway, Fairfield, Iowa
A Subsidiary of Mechanical Handling Systems Inc.

SINCE 1867 . . . THE FIRST NAME IN MATERIALS HANDLING



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FACTORY

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There's something NEW in AIR HANDLING UNITS . . .

DUNHAM-BUSH "COMPACTS"
for COOLING • HEATING • HUMIDITY CONTROL

Compact modern design means lower shipping costs, lower installation costs, less required equipment area, more rigid assembly. 26 models are available, vertical or horizontal . . . with an overlapping range of air deliveries from 1000 CFM to 38,400 CFM.

Dunham-Bush Air Handling Units the "compact line" of the industry offers the architect, engineer, and contractor a diversified selection of floor or ceiling mounted central station units. These units are available with direct expansion, water or steam coils . . . or in combinations of these coils.

The Dunham-Bush-engineered flexibility of the component parts assures delivery of air, conditioned to fulfill any seasonal or product demand. Air can be cooled, dehumidified, filtered, heated and dehumidified . . . depending on the requirement.

Accessory equipment available includes mixing boxes, filter sections, face and by-pass dampers for close humidity control, and both water and steam spray humidifiers.

A wide range of air outlet locations and motor arrangements makes Dunham-Bush Air Handling Units easy to specify—easier to install.

For complete information request catalog 6011C

DUNHAM-BUSH **DUNHAM-BUSH, INC.**

WEST HARTFORD 10, CONNECTICUT, U. S. A.

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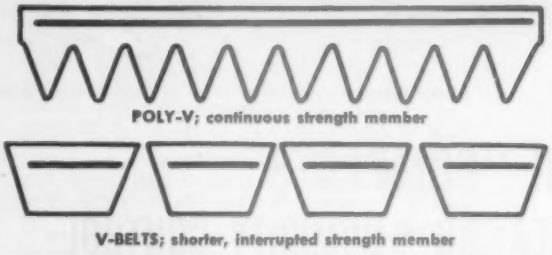

"MORE USE PER DOLLAR"

Poly-V Belt is a single unit with even, uniform pull. Uninterrupted strength member gives much higher hp capacity per inch of drive width. No belt drive delivers as much power in the same space as Poly-V!

Steel Mill Converts to R/M POLY-V BELT on Rugged Hot-Saw Drive!

A 34½" wide R/M Poly-V® Belt of 92 ribs now delivers "power plus" on this punishing hot-saw drive at one of the country's largest steel works. Converting to Poly-V eliminates the problems of a multiple V-belt drive . . . matching, stretching, overloading, whipping and snapping of individual V-belts.

The patented Raybestos-Manhattan Poly-V Drive is a single unit, V-ribbed belt design that mates perfectly with Poly-V sheave grooves, eliminates V-belt stretch and length matching problems . . . reduces costly machine downtime and production slowdowns for individual belt replacement. Sheave ratio and belt position remain constant from *no* load to *full* load . . . assure smooth, *complete* power delivery under the toughest drive conditions. Poly-V Belt can't sink in the grooves under surges of load. This means less wear on belts and sheaves . . . and much more power in the same space as a multiple belt drive—or equal power in much less space!

Just two Poly-V Belt cross-sections meet every heavy duty drive requirement. Let an R/M representative show you how Poly-V Drive can give you greater power-packed performance and drive dependability . . . "More Use per Dollar" than the drive you now use. Write for Bulletin M141.

RM1020

When You Change Drives . . . Convert to R/M Poly-V Drive and Be Sure!

RAYBESTOS-MANHATTAN, INC.

MANHATTAN RUBBER DIVISION, PASSAIC, NEW JERSEY

ENGINEERED RUBBER PRODUCTS . . . MORE USE PER DOLLAR FACTORY

For more facts Circle 566 on Reader Service Card

CESCO

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- Operates at lifting heights from 12" to 50'
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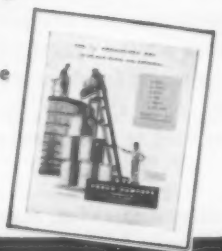
- Empties into mixers, tanks, tumblers, chutes, conveyors, hoppers

Write for comprehensive six page dumper bulletin



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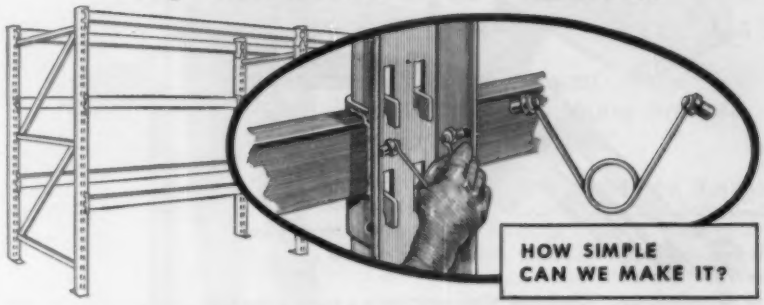

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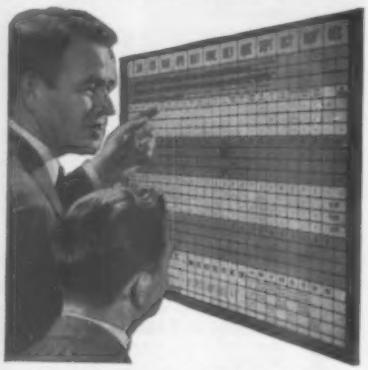

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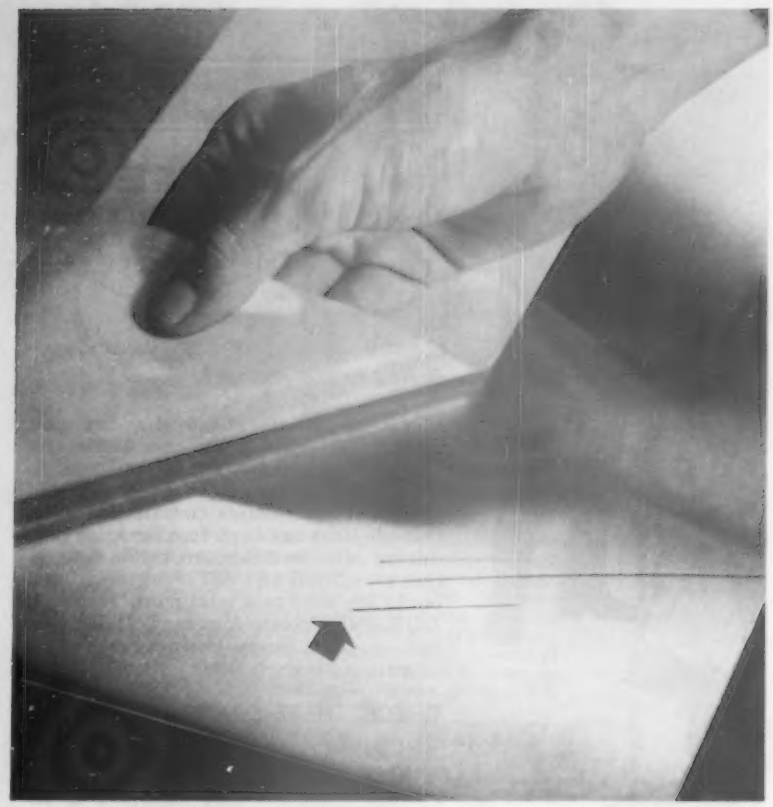

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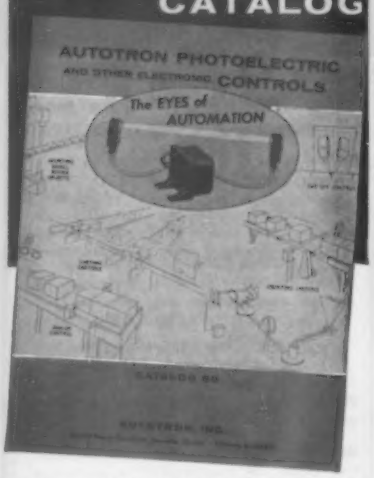

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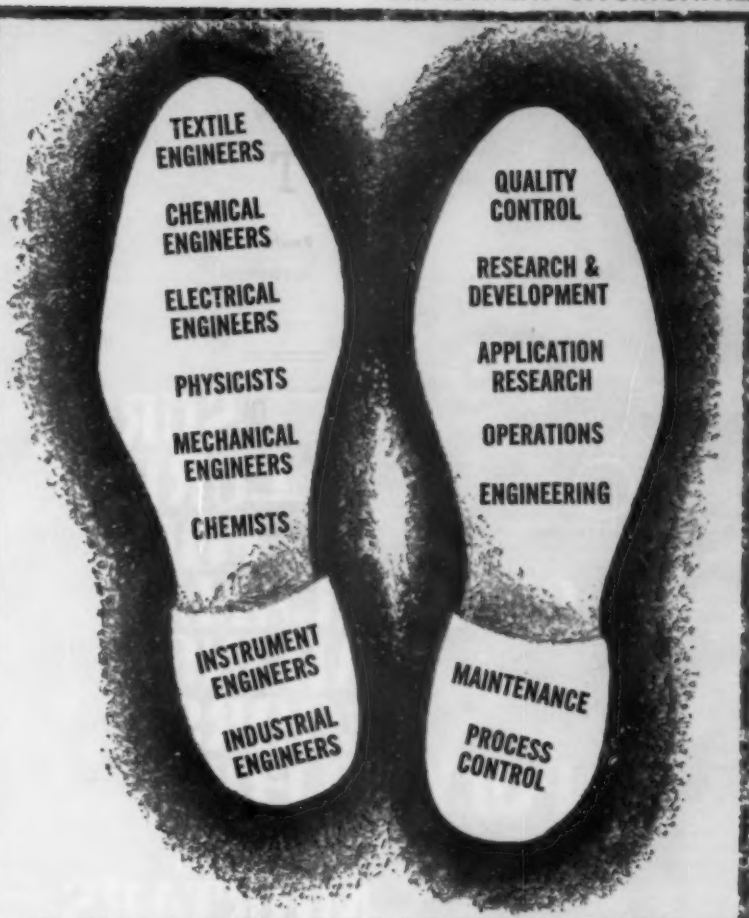

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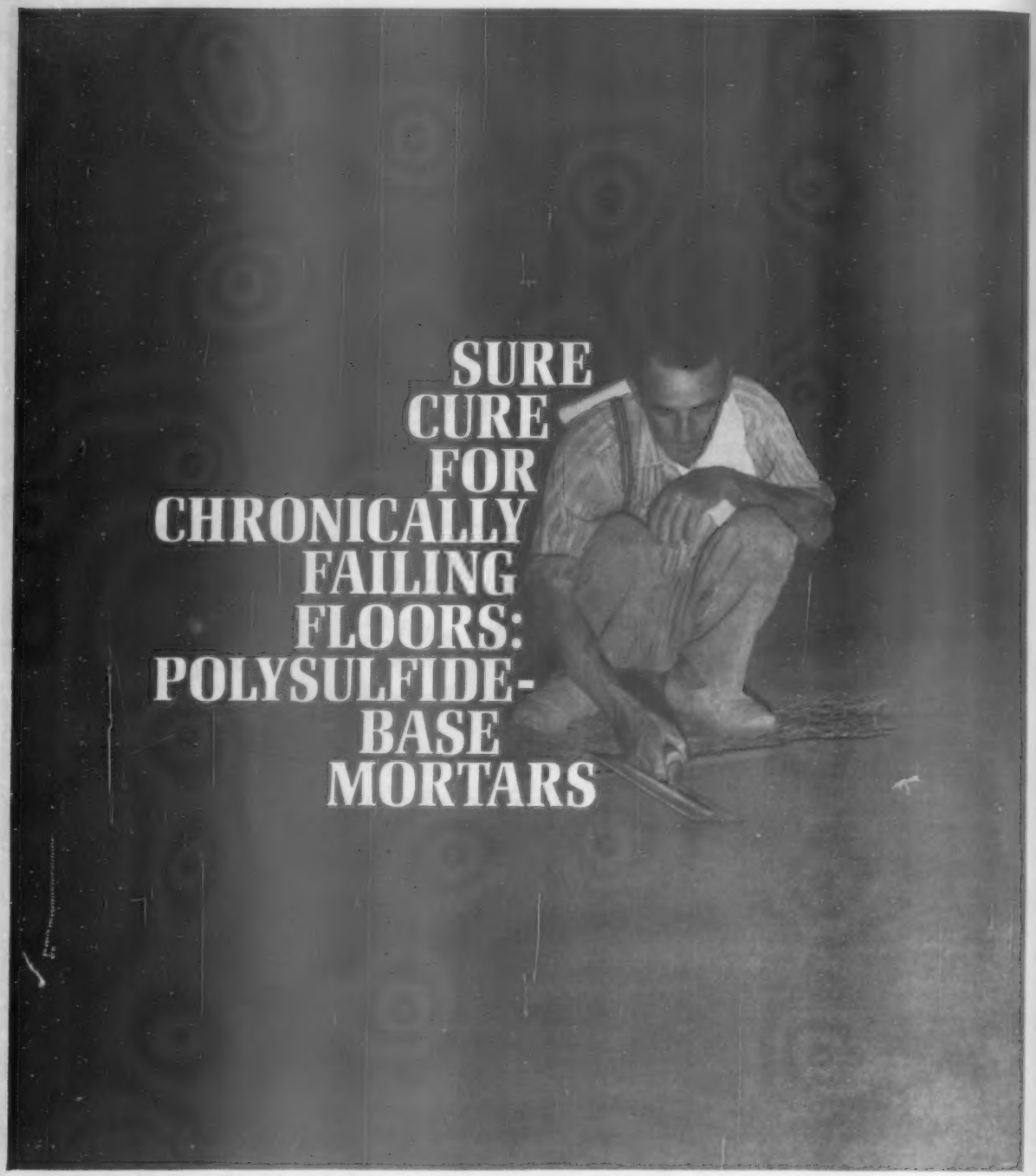

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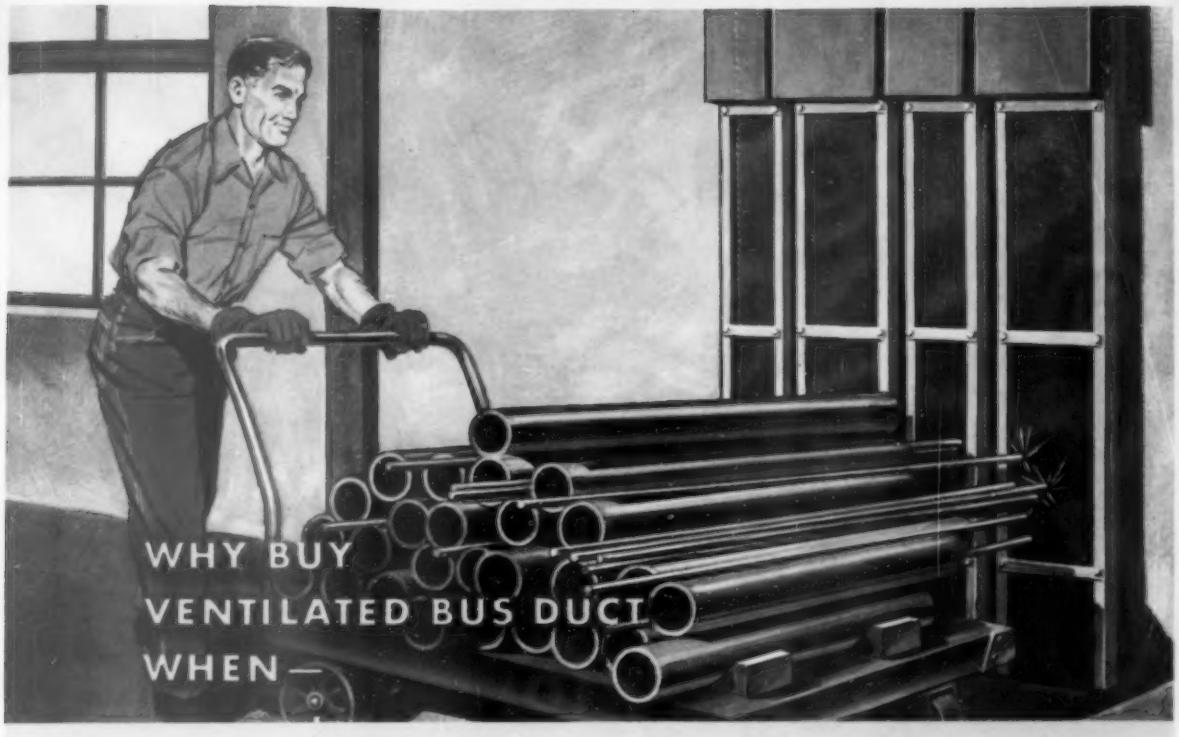

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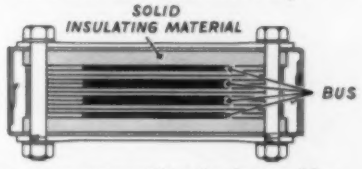

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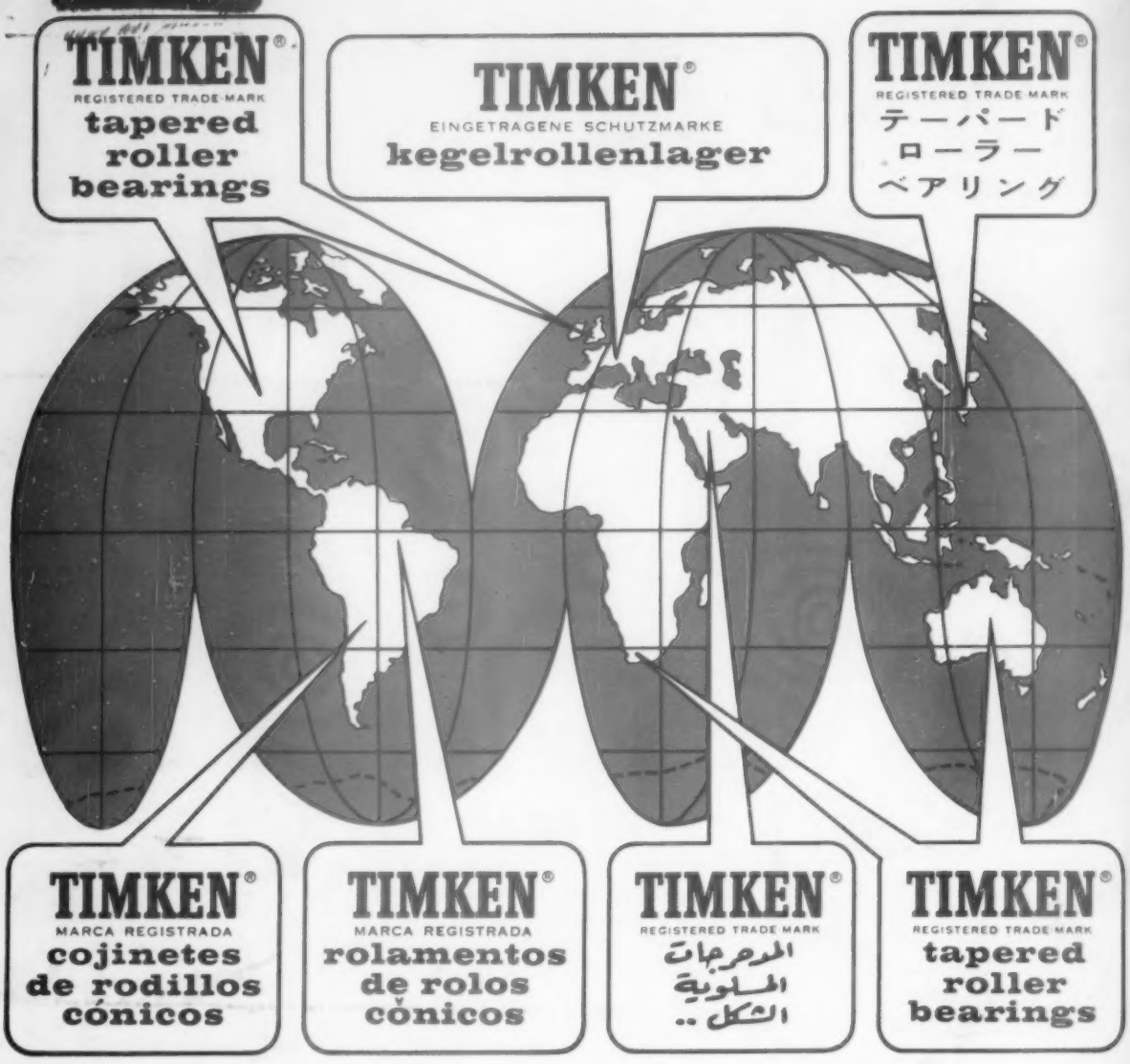

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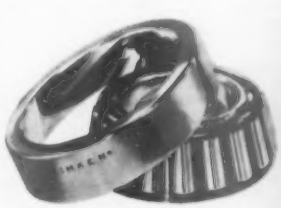

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